



7.0 DISCUSSION AND RECOMMENDATIONS

This chapter provides an implementation strategy for the improvement options introduced in Chapter 6. As this chapter will explain, to fully meet the corridor goals of improving safety conditions and geometric elements within the corridor, full reconstruction of the corridor will ultimately be necessary, but because of factors such as resource allocation and prioritization of projects around the state, reconstruction should be viewed as a long-term target. In the near-term, some of the spot improvements shown in Chapter 6 should be implemented to forward the goal of improving safety. Projected costs for improvements are given and funding sources are discussed.

7.1 Corridor Goals and Objectives

In Chapter 1, a set of corridor goals and objectives was presented that were developed by MDT and FHWA in cooperation with the public. Through the study process the intent was to design improvement options that would:

- Improve safety conditions and address crash concentrations within the corridor.
- Improve roadway geometry within the corridor, including horizontal alignment and vertical alignment, meeting current MDT design standards where practicable.
- Minimize social, environmental, and economic impacts in the corridor where possible.
- Maintain the aesthetic character of the corridor.
- Balance the needs of all users, including local residents, tourists, agricultural vehicles, school buses, motorcyclists, and bicyclists.

At the end of Chapter 4, a list of existing corridor conditions was presented. Many of the items on the list highlight safety issues and a need for improved highway geometry. Some of the conditions, such as narrow shoulders and a lack of places to pull off the roadway, in addition to being safety concerns, also inhibit the ability of the roadway to balance the needs of all users.

Improvement options presented in Chapter 6 attempt to improve both safety conditions and highway geometry. The improvements in Chapter 6 are also designed to meet the objective of minimizing social, environmental, and economic impacts to the corridor area. For example, areas with potential wetlands were avoided or the area of impact was minimized. The improvement options generally follow the existing alignment where possible in an attempt to minimize impacts, including aesthetic impacts.

7.2 Project Programming

MDT assesses funding needs for roadway improvements through a 20-year planning process at the district level. Though individual projects may be reprioritized over the course of the 20-year planning horizon, all available funds are allocated to listed projects over a five-year period. During the last planning process, which occurred in 2006, there were no funds allocated for the



portion of MT 78 within the corridor study area. STPP funding for this level of improvement is highly unlikely over the short term but may be available toward the end of the planning horizon depending on other Primary Highway System needs within the Billings District.

Fully meeting the corridor goal of improving highway geometry to meet current MDT design standards where practicable will require full reconstruction. Reconstruction is seen as a long-term corridor recommendation and would likely be programmed as at least two separate projects; however, progress towards meeting the goal of improving safety conditions in the corridor may be possible through implementation of the spot improvements presented in Chapter 6. Because no funding has been allocated to date for spot improvements, potential sources of funding are identified in this chapter.

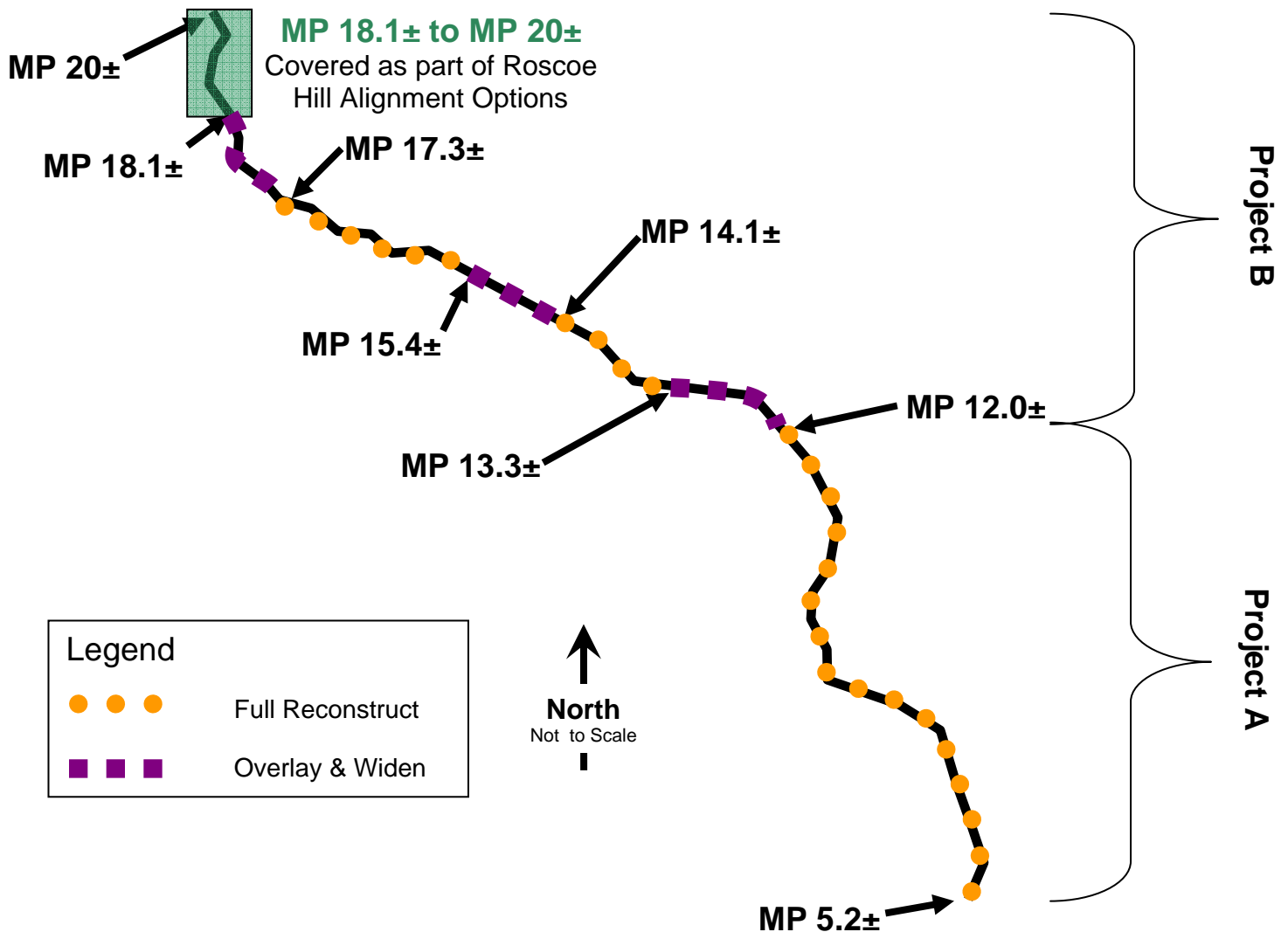
7.3 Reconstruction

The existing horizontal alignment, vertical alignment, and roadway widths and slopes were evaluated to determine the minimum level of improvement necessary to bring the roadway up to current MDT standards. Over much of the corridor, full reconstruction of the roadway is necessary to satisfy current design standards. Full reconstruction would rebuild the entire roadway to make curves less sharp and hills less steep, in addition to widening the roadway to current standards for this type of facility.

Some parts of the existing alignment in the north end of the corridor have a satisfactory alignment, but have narrow travel lane and shoulder widths. An overlay and widen concept could be employed in these areas. An overlay and widen option would use the existing roadway base as the “core” for new construction, with widening occurring at the sides of the roadway. This method of improving the roadway does not necessarily require less right-of-way than a full reconstruction, but under most circumstances it is less costly because it does not require reconstruction of the road base. Figure 7.1 shows the areas in the corridor requiring overlay and widen and the areas requiring full reconstruction.



Figure 7.1 Needed Corridor Improvements



The differences between the southern and northern portions of the corridor lead to a natural split of the corridor into two projects. Project A would involve full reconstruction from MP 5.2± to MP 12.0±. A project length of 6.8± miles is a practical size to develop, finance, and manage through construction. Although the same can be said for the length of the northern portion of the corridor (Project B), the figure demonstrates that within this segment there are areas requiring full reconstruction and other areas that can be improved using an overlay and widen scenario. MDT has determined that it is not cost effective to utilize an overlay and widen concept when more than 25 percent of the proposed project requires full reconstruction. As illustrated in Figure 7.1, nearly half of Project B requires full reconstruction, therefore the overlay and widen



concept is not recommended in this instance. The ultimate improvement strategy for the entire corridor is full reconstruction.

Project B includes Roscoe Hill, located at the far northern part of the corridor (MP 18.1± to 21.0±). As discussed in Chapter 6, options for this portion of the corridor include an overlay and widen scenario where minor changes would be made to the vertical curves to improve sight distance (Alignment Option 1), a full reconstruction option that would rework the vertical alignment while utilizing the existing horizontal alignment (Alignment Option 2), and a full reconstruction option where new horizontal and vertical alignments would be developed to provide grades within the recommended standard (Alignment Option 3). The project terminus for Project B depends on which Roscoe Hill Alignment Option is chosen. If Alignment Option 1 or 2 is chosen, the project would terminate at MP 20.0±. If Alignment Option 3 is chosen, the project would terminate at MP 20.71±.

Table 7-1 provides a summary of planning-level costs associated with reconstruction in the base year (2006). These cost estimates are useful for the purpose of comparing the order of magnitude differences in price relative to each improvement option. More detailed estimates are included in Appendix E.

Table 7-1 2006 Planning-Level Cost Estimates for Reconstruction

Project	Improvement Option	Total Estimated Cost (2006 dollars)
Project A		\$17,900,000
Project B	Roscoe Hill Alignment Option 1	\$16,800,000
	Roscoe Hill Alignment Option 2	\$48,800,000
	Roscoe Hill Alignment Option 3	\$26,000,000

Table 7-2 provides a summary of these costs over the 20-year planning horizon and includes inflation costs of three percent. Detailed calculations are included in Appendix E.



Table 7-2 Planning-Level Cost Estimates for Reconstruction over 20-Year Planning Horizon

Project	Improvement Option	Total Estimated Cost			
		2011	2016	2021	2026
Project A		\$20,700,000	\$24,000,000	\$27,800,000	\$32,300,000
Project B	Roscoe Hill Alignment Option 1	\$19,500,000	\$22,600,000	\$26,200,000	\$30,400,000
	Roscoe Hill Alignment Option 2	\$56,500,000	\$65,500,000	\$76,000,000	\$88,100,000
	Roscoe Hill Alignment Option 3	\$30,200,000	\$35,000,000	\$40,600,000	\$47,000,000

Under Roscoe Hill Alignment Option 1, substandard grades would not be addressed and a design exception would be required. In comparison, remaining on the existing alignment and lowering the grades (as proposed under Roscoe Hill Alignment Option 2) would cost almost three times more in the base year. The additional earthwork and associated cost would only improve the grade by two percent. Only Project B Option 3 incorporates the cost of a new bridge because the alignment shift necessitates a new stream crossing. The existing bridges at East Rosebud and Red Lodge Creeks would be perpetuated under all options. Building the road on a new alignment and bypassing the town of Roscoe is not justified in light of the additional cost and impacts associated with a new bridge.

Though a culvert inventory was not completed for this project, cost calculations for each of the improvement and alignment options include an allowance for the cost of drainage structures on a per mile basis. Fencing and signing were also estimated on a per mile basis (see Appendix E).

Other Potential Corridor Improvements to be Considered as Part of Reconstruction

Roadway Widening

According to the current MDT Route Segment Plan, MT 78 should be widened to 28 feet with any reconstruction effort. This would ultimately provide for 12-foot travel lane widths and two-foot shoulders. Consistent with the Route Segment Plan and MDT policy, the roadway will be initially constructed with three-foot shoulders, which will allow for placement of an overlay in the future. This provides for a longer roadway lifespan.

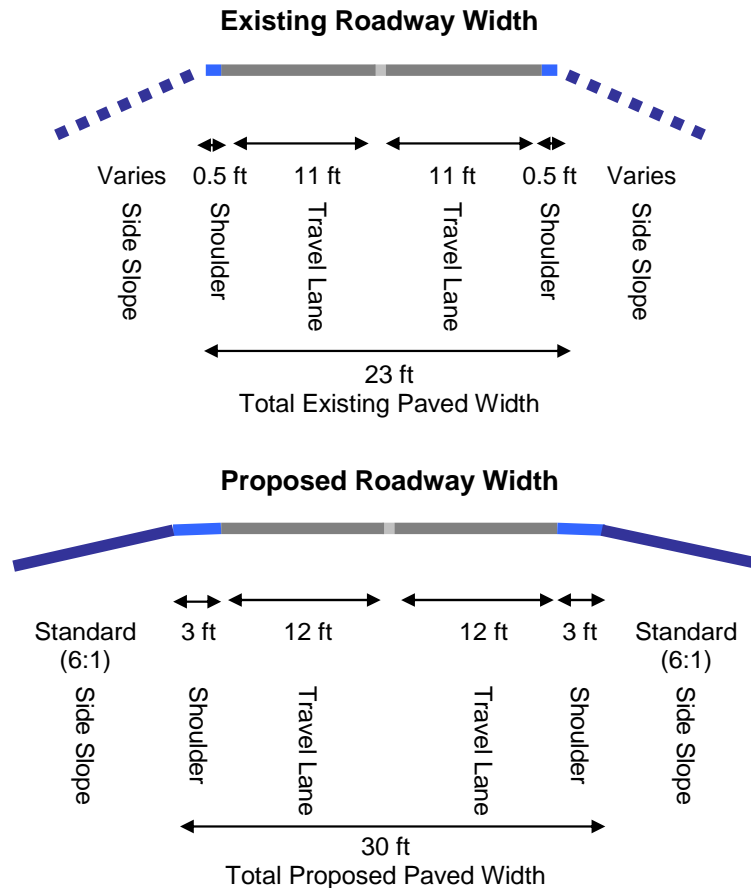
The current MT 78 roadway has approximately 11-foot lanes and approximately 0.5-foot shoulders. Widening would increase each lane by approximately one foot and each shoulder by approximately 2.5 feet. The total paved width would increase by approximately seven feet. The roadway footprint would be considerably wider, however, because implementation of current design standards would result in flatter side slopes for maintenance and safety reasons.



As shown in Figure 7.2, the reconstructed roadway would feature a wider typical section with wider travel lanes (12 feet) and wider paved shoulders (three feet). The existing roadway section shown below is a general representation of field conditions; there is some variation in the existing typical section throughout the corridor.



Figure 7.2 Existing and Proposed Roadway Width



Climbing Lanes

Truck climbing lanes are intended to be constructed on upward gradients to remove heavy vehicles (trucks, buses, RV's) from the through-traffic stream. Heavy vehicles slow on long upward gradients and impede vehicles behind them. This has an adverse effect on safety, increases delay, and can reduce the overall capacity of the roadway. The need for a climbing lane is based on a combination of grade (length and rate), traffic volume, and heavy vehicle volume. *AASHTO Geometric Design of Streets and Highways* states:

On highways with low volumes, only an occasional car is delayed, and climbing lanes, although desirable, may not be justified economically even where the critical length of grade is exceeded. For such cases, slow moving vehicle turnouts should be considered to reduce delay to occasional passenger cars from slow moving vehicles (2004 edition, pg. 244).



AASHTO lists the following criteria for evaluation of climbing lanes to reflect economic considerations:

1. Upgrade traffic flow in excess of 200 vehicles per hour (vph)
2. Upgrade truck flow in excess of 20 vph. One of the following exists:
 - A 10 mph or greater speed reduction is expected for the typical heavy truck
 - Level of service E or F exists on the grade
 - A reduction of two or more levels of service is experienced when moving from the approach to the segment grade

In some instances, safety considerations can override all of these warrant guidelines if there is a specific crash trend involving slow moving vehicles. This safety criterion is not currently met within the MT 78 corridor.

In the design year 2026, the roadway and traffic conditions in the corridor are predicted to be near the threshold for justification of climbing lanes. Further analysis, including a detailed traffic analysis and an economic analysis for each specific location, should be conducted prior to the design of any project. These analyses should compare the total vehicle delay with the construction cost of a climbing lane, including the cost of right-of-way. Based on such analyses, a decision could be made concerning whether a climbing lane is justified and the appropriate location(s) for the lane(s).

Passing Lanes

Passing lanes can be used to improve capacity and reduce delay regardless of the need for climbing lanes. These are typically provided if there is a roadway capacity / vehicle delay problem or a specific crash trend that would be remedied by construction of a passing lane. It may be possible to achieve acceptable passing site distance under the full reconstruction improvement option, at least in some segments of the northern portion of the corridor. It may not be possible to improve passing sight distance in this manner over the southern portion of the corridor where there are limited passing opportunities due to terrain.

Vehicle Turnouts

Turnouts for slow-moving vehicles can be provided as an alternative to climbing lanes. These turnouts are widened areas of the shoulder where slow-moving vehicles can pull out of the traffic stream and allow any following vehicles to pass. These should be considered as part of the more detailed analysis of climbing lanes. They would be much shorter (approximately 500 feet) than climbing or passing lanes.

The Roscoe Hill is the only location where a vehicle turnout might be considered because the hill's substandard grade would not be addressed under the recommended improvement option. Members of the public did not provide input regarding vehicle turnouts. Because of its longer length, a climbing lane would be preferable to a turnout in this location.



Vehicle Pullouts

At public meetings, members of the public were supportive of vehicle pullouts at various places in the corridor. Pullouts are locations where drivers can completely pull off the road and into a designated parking area in order to pause to view scenery, use a cell phone safely, or stop for other reasons. Roscoe Hill (MP 18.8±) was mentioned frequently as a possible vehicle pullout location. Another possible location would be near the Hogan School (MP 7.9±), which was mentioned during meetings as an important historic point of interest for the community.

Access Management

The improvement options shown in Chapter 6 include new horizontal and vertical alignments. Changing the profile of the road as proposed would necessitate new access recommendations not included in the Access Management Study. These are shown in the graphics in Chapter 6 and discussed below.

- Combine two access roads just before the Hogan School south of MP 7.9±. This change would be recommended with the new vertical alignment in order to improve sight distance.
- Move Scilley Mountain Vista Drive access, located south of MP 10.0±. This access has a steep vertical grade; recommended changes to the vertical profile would cause it to be even steeper. The access point should be moved to improve sight distance.
- Realign May Grade Road south of MP 11.0±. This would improve sight distance upon construction of the recommended alignment.

The improvement options in Chapter 6 also highlight the need to realign Upper Luther Road just south of MP 8.2± to improve sight distance. This was also recommended in the Access Management Study.

Recommendations

Based on high crash concentration in the corridor and the anticipated ability of Project A to improve safety in the corridor, Project A, a full reconstruction of MP 5.2± through MP 12.0±, is recommended as a high priority over the long term based on crash concentrations in the area.

Project B, a full reconstruction from MP 12.0 to the end of the corridor, is recommended as a second priority. Based on the costs shown in Table 7-2, the recommended option for Project B is Roscoe Hill Alignment Option 1. Substandard grades would not be addressed under this option and a design exception would be required. Climbing lanes should be considered on Roscoe Hill if Alignment Option 1 is forwarded as part of a project.

In addition to the access realignment recommendations included in this Study and discussed in Section 7.4, the Access Management Recommendations in Appendix E should be included in any future comprehensive roadway project on MT 78.



Purpose and Need

The purpose of both Projects A and B is to improve safety conditions and address crash concentrations within the corridor as well as to improve geometric elements within the corridor to meet current MDT design standards where practicable, including horizontal alignment, vertical alignment, and sight distance.

Projects A and B are needed in the long-term to address safety and operational concerns in the corridor, which can only be partially addressed with near-term improvements.

Potential Funding Sources

As part of the state-designated Primary Highway System, the most prevalent source of funding for improvements along the MT 78 corridor is Surface Transportation Program-Primary (STPP) funds. STPP funds are distributed statewide (MCA § 60-3-205) to each of five financial districts, including the Billings District. The Commission distributes STPP funding based on system performance and projects are let through a competitive bidding process. The federal and state funds available under this program are used to finance transportation projects on the state-designated Primary Highway System. Of the total received, approximately 87 percent are federal and 13 percent are state funds from the state special revenue account. Eligible activities include construction, reconstruction, rehabilitation, resurfacing, restoration, and operational improvements.

The Billings District, which this corridor is a part of, is anticipated to receive an average of about \$15,000,000 to \$20,000,000 annually of STPP funds over the course of the study planning horizon. Current Billings District priorities already under development total an estimated construction cost of \$100,000,000 to \$150,000,000 of which approximately \$33,000,000 is for improvements along segments of the MT 78 corridor outside of this study area. Given the estimated planning level cost of \$40,000,000 to \$70,000,000 to reconstruct the study segment in 2011, STPP funding for this level of improvement is highly unlikely over the short term, but may be available toward the end of the planning horizon depending on other Primary Highway System Needs within the Billings District.

It is recommended that the Billings District plan Long Term Projects A and B into its next 20-year plan, with Project A being the first priority, and Project B being the second.

7.4 Spot Improvements

A number of small spot improvements could be completed at discrete locations independent of full reconstruction of the MT 78 roadway. Each of these improvements was shown in Chapter 6. Table 7-2 (below) lists each of the improvements, notes whether the improvement is located near or at a crash concentration location, describes the long-term geometric improvement that would result as a consequence of the improvement, and states the estimated cost of the improvement in 2006 dollars.



The spot improvements that correspond to a previously identified crash concentration location (see Appendix C) are identified in Table 7-2. It is important to recognize, however, that a “yes” designation does not indicate that the potential interim spot improvement fully addresses the factors that may be contributing to the crash concentration. For example, shaving the side slopes near MP 9.3 would substantially improve horizontal sight distance which is currently restricted by the hillside; however, there are other factors in this vicinity, including vertical sight distance and horizontal curvature, that contribute to crashes but that are beyond the scope of a spot improvement.

The column labeled “Long-Term Geometric Improvements” describes the result of a comparison of spot improvement options to the proposed reconstruction. Some of the spot improvements contribute to the reconstruction improvement options and some of them provide only an interim benefit because additional or new construction work would have to be ultimately conducted in this same area under a full reconstruction. For example, the spot improvement near MP 7.4 would shave the hillside to improve sight distance. The ultimate improvement would include reconstructing the roadway approximately ten feet higher than it presently exists to improve the vertical sight distance. Because the area would ultimately be reconstructed, a spot improvement would only be beneficial in the near term. Cases like this are identified as “Near-term benefits” in the matrix. On the other hand there are situations like the potential improvements near MP 15.8± where shaving the hillside to improve sight distance could be considered as initial work towards the ultimate improvement that would include lowering the roadway grade by approximately four feet to improve vertical sight distance. Cases like these are labeled as “Near- and Long-term benefits” in the matrix. Even improvement options that would have only near-term benefits are recommended for completion due to the safety benefits over the 20-year planning horizon.

Recommendations

The improvements are ranked in Table 7-3 in order of recommendation. Ranking group 1, for example, represents the projects that are recommended for completion first, ranking group 2 represents those projects that should be done second, and so on. There is no ranking of projects within a group. Costs listed in Table 7-3 are in 2006 dollars. The Purpose and Need for each ranking group is discussed separately following the table. Possible sources of funding are then discussed for the entire group of spot improvements.

The factors used to rank improvements are:

- Cost
- Ability to improve safety in a crash concentration location
- Near- and Long-Term Benefits

More detailed estimates are included in Appendix E.



Table 7-3 Recommended Spot Improvements

Ranking Group	Approximate MP	Potential Spot Improvement	Crash Concentration Location*	Near- and Long-Term Geometric Improvements	Estimated Cost (2006\$)
1	6.9, 10.7, 12.1, 13.1, 13.9, 15.1	Update school bus stop signing	Yes; at 6.9, 12.1, and 13.9	None	\$6,700
2	13.0	Trim vegetation for intersection visibility	No	None	\$2,800
3	8.2	Realign Upper Luther Road and build a school bus pullout / Park and Ride	Yes	Access management improvement Near- and Long-term benefits	\$151,000
3	13.0	Realign Lower Luther Road and build a school bus pullout	No	Access management improvement Near- and Long-term benefits	\$164,000
4	9.3	Shave side slopes to improve sight distance	Yes	Major Horizontal Shift 0-10 ft. Vertical Cut Near- and Long-term benefits	\$906,000
5	7.4	Shave side slopes to improve sight distance	Yes	± 10 ft. Grade Raise Minor Horizontal Shift Near-term benefits	\$107,000
5	8.0 – 8.2	Shave side slopes to improve sight distance	Yes	± 5 ft. Grade Raise Minor Horizontal Shift Near-term benefits	\$178,000
6	15.8	Shave side slopes to improve sight distance	No	± 4 ft. Vertical Cut Near- and Long-term benefits	\$720,000
6	16.8	Shave side slopes to improve sight distance	No	Major Horizontal Shift 0-8 ft. Vertical Cut Near- and Long-term benefits	\$1,108,000

* The proposed improvement does not fully address a specific crash trend.

Table 7-4 provides a summary of spot improvement costs over the 20-year planning horizon and includes inflation costs of three percent. Detailed calculations are included in Appendix E.



Table 7-4 Planning-Level Cost Estimates for Spot Improvements over 20-Year Planning Horizon

Ranking Group	Approximate MP	Potential Spot Improvement	Total Estimated Cost			
			2011	2016	2021	2026
1	6.9, 10.7, 12.1, 13.1, 13.9, 15.1	Update school bus stop signing	\$7,800	\$9,000	\$10,500	\$12,100
2	13.0	Trim vegetation for intersection visibility	\$3,200	\$3,800	\$4,400	\$5,100
3	8.2	Realign Upper Luther Road and build a school bus pullout / Park and Ride	\$175,000	\$203,000	\$235,000	\$273,000
3	13.0	Realign Lower Luther Road and build a school bus pullout	\$190,000	\$220,000	\$255,000	\$295,000
4	9.3	Shave side slopes to improve sight distance	\$1,051,000	\$1,218,000	\$1,412,000	\$1,637,000
5	7.4	Shave side slopes to improve sight distance	\$125,000	\$144,000	\$167,000	\$194,000
5	8.0 – 8.2	Shave side slopes to improve sight distance	\$206,000	\$239,000	\$277,000	\$321,000
6	15.8	Shave side slopes to improve sight distance	\$835,000	\$968,000	\$1,122,000	\$1,301,000
6	16.8	Shave side slopes to improve sight distance	\$1,284,000	\$1,489,000	\$1,726,000	\$2,000,000

Ranking Group One: Update School Bus Signage

Purpose and Need

School children are arguably the most at-risk group of highway users because they are on foot when entering or exiting school buses, they may or may not use good judgment, and their size makes them hard to see. The Purpose of updating school bus signage is to help drivers know that children could be in the area, or may be waiting for, entering, or leaving a bus.

There is a need to improve school bus signage in the corridor. There has been an accident involving a school bus at one of the designated school bus stops (MP 6.9±). Three of the six school bus stops are in areas identified as crash concentrations.

Although the location of school bus stops will likely change over time, the relatively small cost of updating signage is justified in light of the risk to school children in the absence of well-marked bus-stops.



Ranking Group Two: Trim Vegetation

Purpose and Need

The Purpose of trimming intersection vegetation is to improve sight distance.

There is a need to improve sight distance at MP 13.0 (Lower Luther Road). At this location, an intersection and a riparian area formed by West Red Lodge Creek are major features along the roadway. The riparian area is a migration corridor for wildlife, which presents a traffic hazard and the intersection is difficult to see because of overgrown vegetation.

Although this area is not a crash concentration location, improved sight distance is considered to be important considering the relatively small cost of the improvement, approximately \$2,500.

Ranking Group Three: Build School Bus Pullouts

Purpose and Need

The Purpose of building school bus pullouts is to give the Red Lodge School safe school bus stops that are located fully out of the travel lane. School children are arguably the most at-risk group of highway users because they are on foot when entering or exiting school buses, they may or may not use good judgment, and their size makes them hard to see. The School District could use the parking areas at Upper and Lower Luther roads as areas to meet parents to drop off or pick up children traveling to school and as a place of refuge in case of inclement weather or mechanical problems.

There is a need to improve school bus stop conditions in the corridor. The Superintendent of Red Lodge schools reports that the Upper Luther Road (MP 8.2±) is seen as a very dangerous intersection by bus drivers because of sight distance issues. Lower Luther Road (MP 13.0±) is in a crash concentration area.

There is an added benefit of building a pullout at Upper Luther Road. That intersection is currently used as an informal park-and-ride by Stillwater mine employees. The pullout could be built large enough to be formally used as a park-and-ride for little additional cost.

Upper and Lower Luther Roads are ideal locations for pullouts because they are spaced along the corridor such that, including the possibility to pull out at Roscoe, there would be a pullout location every five miles of the corridor (MP 5 to MP 10, MP 10 to MP 15, and MP 15 to MP 20).

Ranking Group Four: Shave Side Slopes at MP 9.3±

Purpose and Need

The Purpose of shaving side slopes at MP 9.3± is to improve sight distance.

There is a need to improve sight distance at MP 9.3. This area has been identified as a crash concentration location. Safety would likely be improved to some degree by improving sight



distance at the location. Improving sight distance at this location would have both near- and long-term benefits, as shaving side slopes fits into the proposed eventual reconstruction recommended in this portion of the corridor.

Ranking Group Five: Shave Side Slopes at Two Crash Concentration Locations

Purpose and Need

The Purpose of shaving side slopes at MP 7.4 and MP 8.0 to MP 8.2 is to improve sight distance.

There is a need to improve sight distance at both locations. The areas have been identified as crash concentration locations. Safety would likely be improved to some degree by improving sight distance at these locations.

Improving sight distance at these locations would have only near-term benefits as they do not dovetail into the proposed eventual reconstruction necessary in this portion of the corridor. However, the cost of these improvements is relatively low – about \$250,000 overall.

Ranking Group Six: Shave Side Slopes to Improve Sight Distance

Purpose and Need

The purpose of shaving side slopes at MP 15.8± and MP 16.8± is to improve sight distance.

These improvements are needed because sight distance in this portion of the corridor is very poor. Based on a visual inspection and plan review, these improvements were considered to be beneficial.

Ranking Groups One – Six: Spot Improvements

Potential Funding Sources

Some sources of funding exist for spot improvement options. One potential source of funding is the Highway Safety Improvement Program (HSIP). HSIP funds are federally apportioned to Montana and allocated to safety improvement projects identified in the strategic highway safety improvement plan by the Commission. Projects described in the State strategic highway safety plan must correct or improve a hazardous road location or feature, or address a highway safety problem.

Another potential source of funding is maintenance money. There may be enough money in the Billings District maintenance budget over the next several years to fund relatively inexpensive projects, such as improving school bus signage or trimming vegetation.

For the Upper Luther Road spot improvement location, the Stillwater mine might be willing to allocate some funds toward the creation of a park-and-ride for their employees.

Surface Transportation Program-Primary (STPP) funds may be another potential funding source for spot improvement options. These funds are currently fully allocated. However, should funds



become available due to budget changes or shifts in project priorities, these spot improvement projects would be a good use of STPP funds.

7.5 Summary of Recommendations

Decisions about future highway improvements within the study corridor are the responsibility of MDT with approvals necessary from the Montana Transportation Commission, FHWA, and federal and state resource agencies. Based on the results of this corridor study, the following could provide the basis for establishing the Purpose and Need for future improvements to the corridor:

Purpose

- In the near- and long-term, improve safety conditions within the MT 78 corridor.
- In the near- and long-term, improve geometric elements within the corridor to meet current MDT design standards where practicable, including horizontal and vertical alignment.

Need

- There are crash concentrations throughout the corridor.
- There are substandard geometric elements throughout the corridor.

The following improvement options are recommended by this corridor study:

Near Term:

- Update school bus signage
- Trim intersection vegetation
- Build two school bus pullouts, at MP 8.2± and MP 13.0±
- Shave side slopes to improve sight distance at MP 7.4±, MP 8.0 to MP 8.2±, MP 9.3±, MP 15.8±, MP 16.8±

Long Term:

- Reconstruct the highway from MP 5.2± to MP 12.0±
- Reconstruct the highway from MP 12.0± to MP 20.0±

Appendix A

Public Comments Received



MT 78

Corridor Study

Public Scoping Meeting
March 2006

We Invite Your Comments:

I live on Brewery Hill. I have water rights to the ditch running in front of my house. In the event highway improvements include a culvert in lieu of ditch, I want to be sure there is at least a T-joint from the main culvert to the ditch that runs on my property, ~~thence~~ it and north to the neighbors, who also claim water rights.

I am still concerned with high speeds on Brewery Hill and fear that improving the highway will only increase it. Also, I hope a roundabout is being considered at the junction of 78 and 212.

To receive further project information, please provide your name and address:

Name: RUTH H. SELLER

Address: 17C 50, BOX 4010
RED LODGE MT
59068

Please leave your comments with Project Team staff at the meeting, or mail to :

Darryl L. James
HKM Engineering Inc.
PO Box 1009
Helena, MT 59624-1009





MT 78

Corridor Study

Public Scoping Meeting
March 2006

We Invite Your Comments:

Montana's Highway alignment through Agriculture Land use areas, from travel observation, would be assisted in maintaining highway vehicle capacity with the establishment of well designed and placed turnouts. turn outs are used by most slow moving trucking carrying live stock feed, corn, sugar beets, livestock to feed lots etc. also visitors tend to use turn outs to enjoy views, brief rests and to separate traffic. turn outs are less costly than rest areas, may be highly effective especially in areas of high Scenic Value. turn outs may assist in lowering accidents.

Montana State enjoys visitors traveling interstate and intrastate. visitors contribute a significant economic benefit to the State economy.

To receive further project information, please provide your name and address:

Name: George Chapper

Address: PO Box 11621

Red Lodge, MT 59068

446 2436

Please leave your comments with Project Team staff at the meeting, or mail to :

Darryl L. James
HKM Engineering Inc.
PO Box 1009
Helena, MT 59624-1009

HKM

Miller, Zoe

From: Don Kinney [rlprojectmanager@vcn.com]
Sent: Thursday, March 30, 2006 3:51 PM
To: Zoe Miller; Jennifer Peterson
Cc: Barry Usher; David Beach; Don Kinney; Estelle Tafoya; Jody Ronning; John Prinkki; judytoler@montana.net; Kathy Teter; Larry Yung; Laura Getz; Rich Bruner; Tom Kohley; Bob Carr; Donna Bastain; George Cartwright; John Gilligan; John Toler; Marcella Manuel; Red Lodge Area Chamber of Commerce; Terri Holt
Subject: HWY 78 scoping comments

Zoe & Jennifer,

First, it was great to meet both of you in Red Lodge and I am sure we will run into each other again in the near future.

My comments for the Highway 78 scoping follows:

The road is used by many tourists to travel between Red Lodge and Columbus to view the Beartooth Mountains. The road's allure in many respects is the "curving" nature of the road which gives it a county / rural feeling vs. a major road feel. During the warm months many thousand motorcycle enthusiasts ride the road to experience the views and the curves of the road following the contours of the land. Highway 78, along with the Beartooth All American Road, is a major tourist attraction for the Red Lodge area. The new design of the road must make the road safe by modifying the vertical and horizontal curves; however, it must not be made so "straight" as to take away from the ambiance of road travel for these visitors to our area. As one who travels the first fourteen miles of this section daily I too like the "feel" of the road and I want the majority of the contour hugging attributes to remain, but I want it safer.

My second request is regarding providing a "dual use" for the road. Many road bikers (peddle bikers) would love to ride the route along with the auto traveler to experience the same views and "feel" of the road that motor bikers enjoy, but cannot due to the narrowness of the present route. Any redesign must be done in a manor to provide safe and sufficient biking lanes in both directions. This would be a major attraction for road biker of all strips to come to our region to enjoy the views along the route and feel safe in doing so.

Thanks for taking my comments.

Don L. Kinney, AICP, CED
dkinney@direcway.com or rlprojectmanager@vcn.com

3/31/2006

traffic on Mt Hy Route 78 is increasing slowly and steady ~~for a number of reasons.~~ ^{as a result} increasing visitor use, Subdivision Development, etc. Land use along this Corridor is essentially Devoted to Raising Livestock, Cow calf operations, wool growing (sheep operation) and horses for general use, trail riding and horses trained for sale. ^{the capacity of Hy 78 to carry vehicle traffic may be somewhat} impaired by the severe undulation of the Alignment ~~in some areas~~ across the beartooth Front. However the Alignment presents delightful Views for visitors. ^{Increasing Numbers} Road approaches to this high way may tend to reduce the smooth flow of traffic on the highway. Slow moving Vehicles, Farm type trucks and trucks carrying Supplies to the communities along this Corridor ~~may~~ tend to slow the smooth flow of General traffic. Paper Bear hotdogs, garbage turn outs, well Placed and designed along Hy 78 Corridor may serve to separate slow moving Vehicles from general traffic

And aid orderly flow of traffic.
Also turn outs enhance visitor travel
with opportunity for delightful views,
brief stops for a stretch from driving
and ^{etc,} other use.

Turn outs ^{may be} ~~are~~ helpful to assure H_y
capacity for traffic and for reducing
accident danger.

H_y 89 Livingston - Gardiner has well
designed turnouts with good sight
distance for entering or leaving the
turn out. These turnouts are essentially
situated in the vicinity of Yankee Jim
Canyon and Gardiner.

H_y 212 Laurel to Rockvale needs a
turnout as traffic being backed up for
a considerable distance as a result of slow
moving trucks + farm equipment and
traffic congestion.

I think two turnouts on the Route Roscoe -
Red Lodge would benefit traffic -
one on Hill as H_y leaves Roscoe +
one about half way to Red Lodge.

Turnouts may be established at
Nominal Cost for maximum benefit.

Appendix B

Project Newsletters

MT 78 Corridor Study



June 2006

Project Newsletter No. 1

What is the MT 78 Corridor Study?

The Montana Department of Transportation (MDT) has initiated a corridor planning process along the MT 78 corridor in order to comprehensively assess future transportation needs, prioritize future transportation projects, provide opportunities for early public input and resource agency coordination, and foster cooperative state and local transportation planning efforts. Corridor planning is a relatively new tool within the Montana Department of Transportation (MDT) emphasizing public involvement and consideration of environmental issues at the planning level. Early corridor planning may save the state time and money by giving a context to later planning and environmental compliance documents.

Corridor planning is a process that is collaborative with local governments as well as regulating and resource agencies and includes extensive public participation opportunities. The process is designed to derive a planning-level analysis of the existing transportation system within the corridor and determine how it could be changed or managed to meet long-term needs.

What is a corridor?

A corridor is a broad geographic area defined by existing travel patterns that provides important connections for the movement of people, goods, and services within and between regions of the state.

What is the project's primary purpose?

This planning process will examine the existing transportation facility and travel characteristics, as well as existing social, economic and environmental issues within the corridor. The end result of the study will be a comprehensive package of recommendations intended to satisfy current design standards, meet mobility and level of service targets, improve safety, and fit within cost and constructability constraints.

MDT attempts to provide accommodations for any known disability that may interfere with a person participating in any service, program, or activity of the Department. Alternative accessible formats of this information will be provided upon request. For further information, please call (406)442-0370 or TTY (800)335-7592, or by calling Montana Relay at 711. Accommodation requests must be made within 48 hours of a public meeting.



What is involved in the Corridor Planning Process?

The Corridor Planning Process has several distinct phases that are illustrated as mileposts in the graphic below. There are two key aspects to this study: a proactive public participation program to ensure that we understand your concerns, and a rigorous exploration of improvement options to ensure that we are being responsive to the needs of area residents and users of the area's transportation facilities. We are now nearing the end of the scoping phase of the study and are developing and analyzing a variety of improvement options.

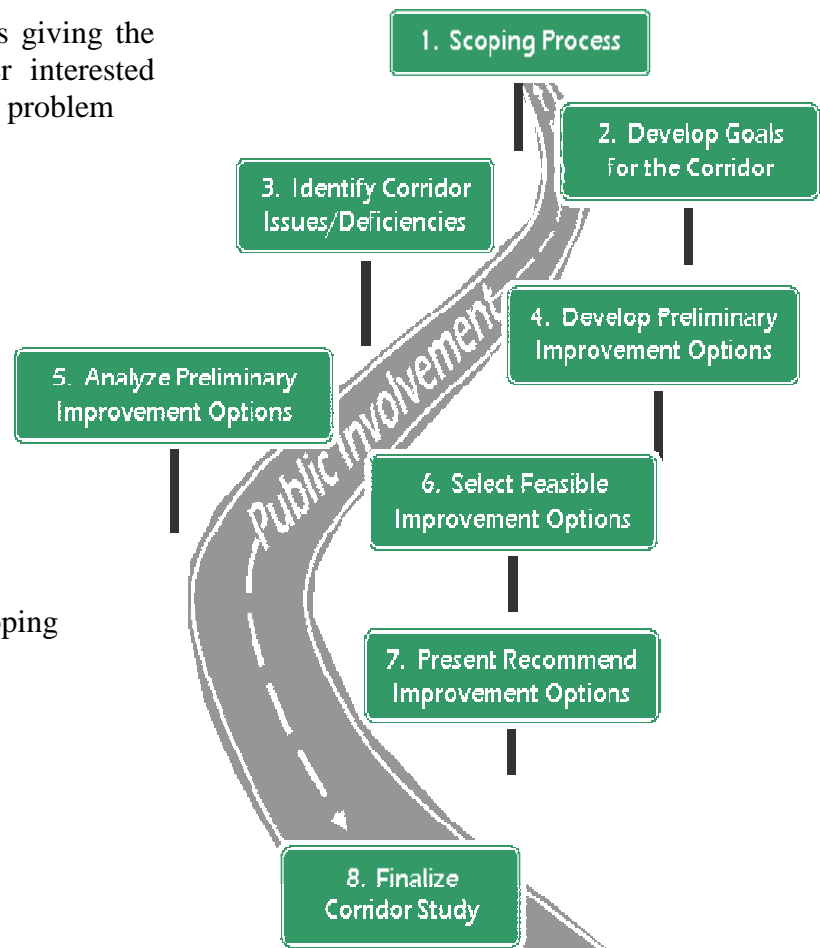
Scoping

Scoping is an active consultation process giving the public, resource agencies, and all other interested parties an opportunity to help identify any problem areas or individual concerns relevant to the project, and to suggest opportunities for improvement.

Public scoping meetings were held for this project on Tuesday, March 28 at the Roscoe Community Center and Thursday, March 30 at the Roosevelt Middle School in Red Lodge. We listened to your comments and had a productive discussion about the proposed project.

Some of the issues raised at the public scoping meeting (in no order of priority) were:

- ▶ Safety concerns
- ▶ Project cost
- ▶ Design considerations
- ▶ Aesthetic impacts
- ▶ Impacts to agriculture and tourism
- ▶ Pedestrian and bicycle facilities
- ▶ Traffic control and traffic volume



Next Step: Develop Improvement Options

In response to geometric and operational analyses and public input, improvement options will be developed to determine how well each meets the overall goals and objectives for this corridor. Once we have developed an initial range of options, we will schedule another public meeting to gather your input.

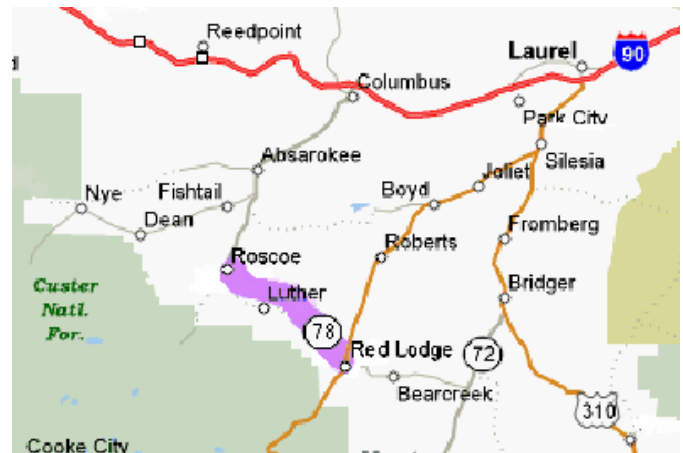


Is there a Need for this Project?

The MT 78 alignment between Red Lodge and Roscoe does not meet current design and safety standards. Ninety-seven of the 117 vertical curves within the project limits fail to meet the minimum stopping sight distance (SSD) requirement. Thirty-six of these curves fail to meet the maximum gradient. Fifty-one of the 55 passing opportunities within the project limits fail to meet the minimum passing sight distance (PSD) requirement. Fifteen of the 43 horizontal curves are too tight. As a result of these conditions, the accident rate for the segment is 65 percent higher and the accident severity rate is 62 percent higher than the statewide average for all primary roads. Consequently, there is a need to plan for improvements to this corridor.

Where will the project be located?

MT 78 is a two-lane highway that begins at the town of Red Lodge and runs through Roscoe, Absarokee, and Columbus before intersecting with Interstate 90. The portion of the highway chosen for this study begins five miles north of Red Lodge and extends to the north end of Roscoe.



Schedule

This Corridor Study is scheduled to be completed within a twelve (12) month timeframe. Project activities are detailed in the schedule below.

	2005					2006							
	N	D	J	F	M	A	M	J	J	A	S	O	N
Scoping/Data Collection	■												
Public Scoping Meeting					★								
Develop Goals for the Corridor						■	■	■	■	■			
Development of Alternatives							■	■	■	■			
Public Meeting – Generate Alternatives											★		
Analysis of Alternatives									■	■	■	■	■
Selection of Feasible Alternatives												■	■
Internal Review and Revisions												■	■
Public Meeting - Present Recommended Alternatives													★
Corridor Study Issued													★
Newsletters								✓				✓	



MT 78 Corridor Study

How Can I Stay Involved?

Please mail or email your name and address to HKM Engineering to receive further newsletters. We encourage you to continue to participate in further public involvement activities, and hope you will make sure your friends and neighbors are also aware of the project. You can also contact the Project Team at the phone numbers and addresses listed to the right.

Next Public Meeting . . .

We are currently developing a range of options. We will be coming back out to the community to discuss the most promising options and request further input to select a set of feasible options that meet the needs of the corridor, are environmentally sound, and physically and financially feasible. We anticipate this meeting to occur sometime in July, so watch the newspaper for an announcement.

For more information, please contact:

Bruce Barrett
Billings District Administrator
MDT

424 Morey St.
PO Box 20437
Billings, MT 59104-0437
(406) 657-0210
bbarrett@mt.gov

Carol Strizich
Project Manager
MDT Planning

2701 Prospect Drive
PO Box 201001
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(406) 444-9240
cstrizich@mt.gov

Darryl L. James
Project Manager
HKM Engineering
7 West 6th Avenue, Suite 3W
P.O. Box 1009
Helena, MT 59624
(406) 442-0370



The Power Block West
7 West 6th Avenue, 3W
P.O. Box 1009
Helena, MT 59624-1009

MT 78 Corridor Study



September 2006

Project Newsletter No. 2

What is the MT 78 Corridor Study?

The Montana Department of Transportation (MDT) has initiated a corridor planning process along the MT 78 corridor in order to comprehensively assess future transportation needs, prioritize future transportation projects, provide opportunities for early public input and resource agency coordination, and foster cooperative state and local transportation planning efforts. Corridor planning is a relatively new tool within the Montana Department of Transportation (MDT) emphasizing public involvement and consideration of environmental issues at the planning level. The study will focus on assessment of the existing transportation system within the corridor and determine how it could be changed or managed to meet long-term needs.

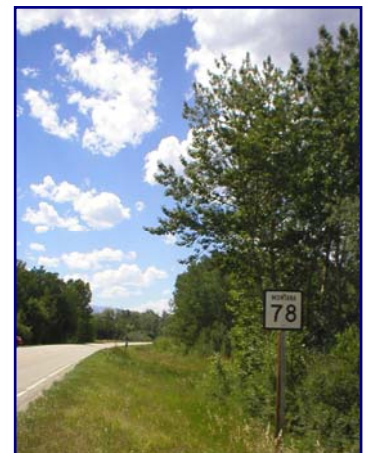
Where is the study located?

MT 78 is a two-lane highway that begins at the town of Red Lodge and runs through Roscoe, Absarokee, and Columbus before intersecting with Interstate 90. The portion of the highway chosen for this study begins at milepost 5.0 northwest of Red Lodge and extends milepost 20.15 southeast of Roscoe.

Purpose of the Study

The primary intent of this study is to present a set of alternatives that:

- Improve safety conditions and address accident concentrations within the corridor
- Improve geometric elements within the corridor to meet current MDT design standards, including horizontal alignment, vertical alignment, and sight distance



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MT 78 Corridor Study

What is involved in the Corridor Planning Process?

The Corridor Planning Process has several phases that are illustrated as mileposts in the graphic below. There are two key aspects to this study: a proactive public participation program to ensure that we understand your concerns, and a rigorous exploration of improvement options to ensure that we are being responsive to the needs of area residents and users of the area's transportation facilities. We have begun developing goals for the corridor, identifying corridor deficiencies, and developing preliminary improvement options.

Corridor Goals

Goal setting is an active consultation process giving the public, resource agencies, and all other interested parties an opportunity to help identify a vision for the corridor.

A set of preliminary corridor goals have been developed in cooperation with MDT and with input from the public involvement process. These goals, together with baseline data, will be used to evaluate alternatives and identify the most desirable alternatives to be included in this Plan's recommendations.

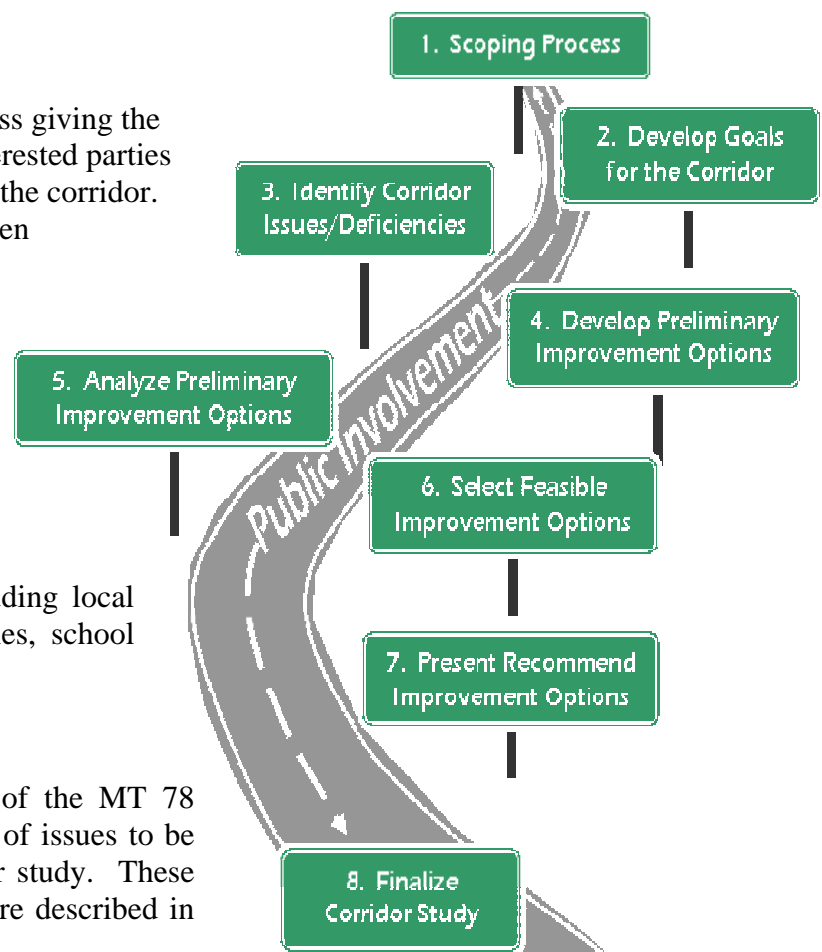
Preliminary corridor goals include:

- Preserve the character of the corridor
- Balance the needs of all users, including local residents, tourists, agricultural vehicles, school buses, motorcyclists, and bicyclists

Corridor Deficiencies

The investigation of existing conditions of the MT 78 transportation system identified a number of issues to be considered in development of the corridor study. These existing corridor deficiencies and issues are described in the following list.

1. Steep grades exist over a large portion of the corridor.
2. Sharp curves exist at the southern and northern ends of the corridor and at a few scattered locations within the middle portion of the corridor.
3. Passing and stopping sight distances are limited not only due to poor horizontal and vertical alignment, but also due to steep side slopes in several locations.
4. Shoulder widths throughout the corridor are not wide enough to safely accommodate vehicle stops or bicycle travel.
5. There are a number of poorly-aligned access points along the corridor.
6. Accident concentrations are located between MP 5 to 9.5 and from MP 18.5 to 20, as well as in scattered locations between MP 12 to 14 and MP 17 to 18.





Preliminary Improvement Options

In response to geometric and operational analyses and public input, we have developed a set of preliminary improvement options for the corridor. The figures shown below are included as representative examples of these improvement options. Figure 1 is an aerial photograph of the MT 78 highway between MP 9.3 and MP 9.8. The existing roadway is visible as a gray line on the aerial. The blue line shows the proposed new horizontal alignment, which would decrease the sharpness of the horizontal curve to improve sight distance. Figure 2 is a profile view of the same portion of the roadway. The gray line represents the existing roadway, and the blue line represents the proposed new grade, which would also improve sight distance. The numbers on the right and left side of Figure 2 are elevations.

Figure 1
Aerial
View

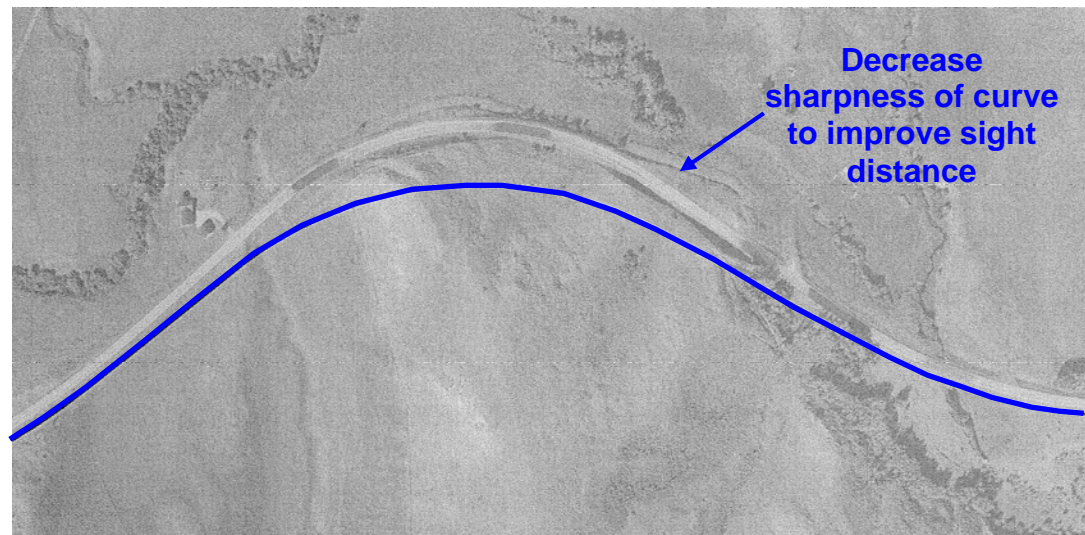
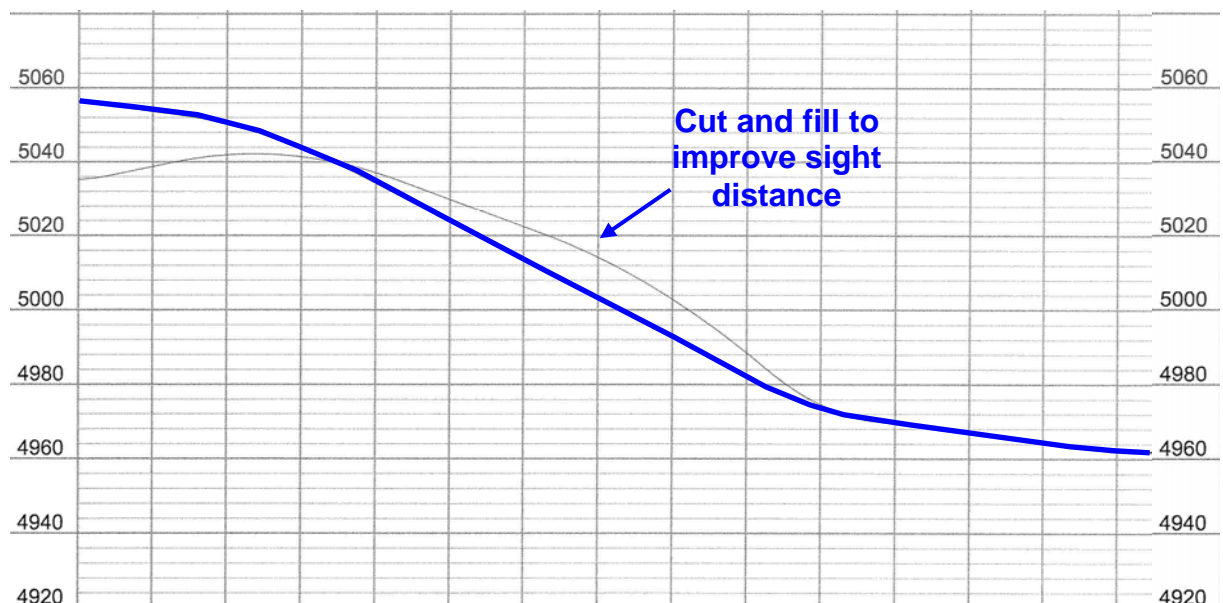


Figure 2
Profile
View





How Can I Stay Involved?

We encourage you to continue to participate in further public involvement activities, and hope you will make sure your friends and neighbors are also aware of the project. You can contact the Project Team at the phone numbers and addresses listed to the right.

Next Public Meeting . . .

We have developed a set of preliminary goals for the corridor, identified corridor deficiencies, and developed preliminary improvement options. We will be coming back out to the community to discuss the preliminary goals and the most promising improvement options. At that time, we will request further input to select a set of options that meet the needs of the corridor, are environmentally sound, and physically and financially feasible. The next public meeting will be held on **September 20, 2006** from **7:00 pm to 9:00 pm** at the **Roscoe Community Center** north of Roscoe. We invite you to join us!



The Power Block West
7 West 6th Avenue, 3W
P.O. Box 1009
Helena, MT 59624-1009

For more information, please contact:

Bruce Barrett

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424 Morey St.
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Darryl L. James

Project Consultant
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Helena, MT 59624
(406) 442-0370

MT 78 Corridor Study



August 2007

Project Newsletter No. 3

What is the MT 78 Corridor Study?

The Montana Department of Transportation (MDT) has completed a corridor planning process along the MT 78 corridor in order to comprehensively assess future transportation needs, prioritize future transportation projects, provide opportunities for early public input and resource agency coordination, and foster cooperative state and local transportation planning efforts.

MT 78 is a two-lane highway that begins at the town of Red Lodge and runs through Roscoe, Absarokee, and Columbus before intersecting with Interstate 90. The portion of the highway chosen for this study begins at milepost 5.0± northwest of Red Lodge and extends to milepost (MP) 20.0± southeast of Roscoe.

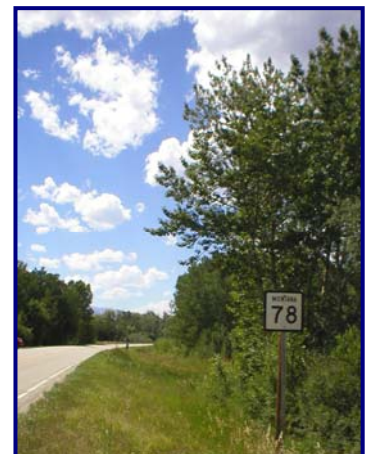
The study presents a set of improvement options that:

- Improve safety conditions and address accident concentrations within the corridor.
- Improve geometric elements within the corridor, including horizontal alignment, vertical alignment, and sight distance.

What issues were identified?

The investigation of the existing MT 78 transportation system identified a number of issues. These existing corridor deficiencies and issues are described in the following list.

7. Steep grades exist over a large portion of the corridor.
8. Sharp curves exist at the southern and northern ends of the corridor and at a few scattered locations within the middle portion of the corridor.
9. Passing and stopping sight distances are limited not only due to poor horizontal and vertical alignment, but also due to steep side slopes in several locations.
4. Shoulder widths throughout the corridor are not wide enough to safely accommodate vehicle stops or bicycle travel.
5. There are a number of poorly-aligned access points along the corridor.
6. Accident concentrations are located between MP 5 to 9.5 and from MP 18.5 to 20, as well as in scattered locations between MP 12 to 14 and MP 17 to 18.



An inventory of existing social, economic, and environmental conditions was conducted for the study. Because the proposed improvements are either on or close to the existing alignment and are limited to minor widening and alignment shifts, impacts to resources are not anticipated to be significant for the purpose of future environmental compliance.



MT 78 Corridor Study

Summary of Improvement Options

In response to geometric and operational analyses and public input, a set of short-term and long-term improvement options was developed for the corridor. Efforts were made to avoid or minimize impacts to known constraints, such as wetlands and historic resources, within the corridor. The following provides a summary of these options.

Short Term Improvement Options

Short-term improvement options were ranked based on the following criteria: cost, ability to improve safety in a crash concentration location, and near- and long-term benefits. Based on their respective rankings under these criteria, each of the spot improvements were then assigned a priority ranking as follows.

High Priority Improvement Options

- Update school bus stop signing at MP 6.9, 10.7, 12.1, 13.1, 13.9, and 15.1.
- Trim vegetation for intersection visibility at MP 13.0.

Moderate Priority Improvement Options

- Realign Upper Luther Road and build a school bus pullout / Park and Ride at MP 8.2.
- Realign Lower Luther Road and build a school bus pullout at MP 13.0.
- Shave side slopes to improve sight distance at MP 9.3 and MP 7.4, and from MP 8.0 through 8.2.

Low Priority Improvement Options

- Shave side slopes to improve sight distance at MP 15.8 and MP 16.8.

Short Term Improvement Option Costs

Ranking Group	Approximate MP	Potential Spot Improvement	Estimated Cost (2006 dollars)
1	6.9, 10.7, 12.1, 13.1, 13.9, 15.1	Update school bus stop signing	\$6,700
2	13.0	Trim vegetation for intersection visibility	\$2,800
3	8.2	Realign Upper Luther Road and build a school bus pullout / Park and Ride	\$151,000
3	13.0	Realign Lower Luther Road and build a school bus pullout	\$164,000
4	9.3	Shave side slopes to improve sight distance	\$906,000
5	7.4	Shave side slopes to improve sight distance	\$107,000
5	8.0 – 8.2	Shave side slopes to improve sight distance	\$178,000
6	15.8	Shave side slopes to improve sight distance	\$720,000
6	16.8	Shave side slopes to improve sight distance	\$1,108,000



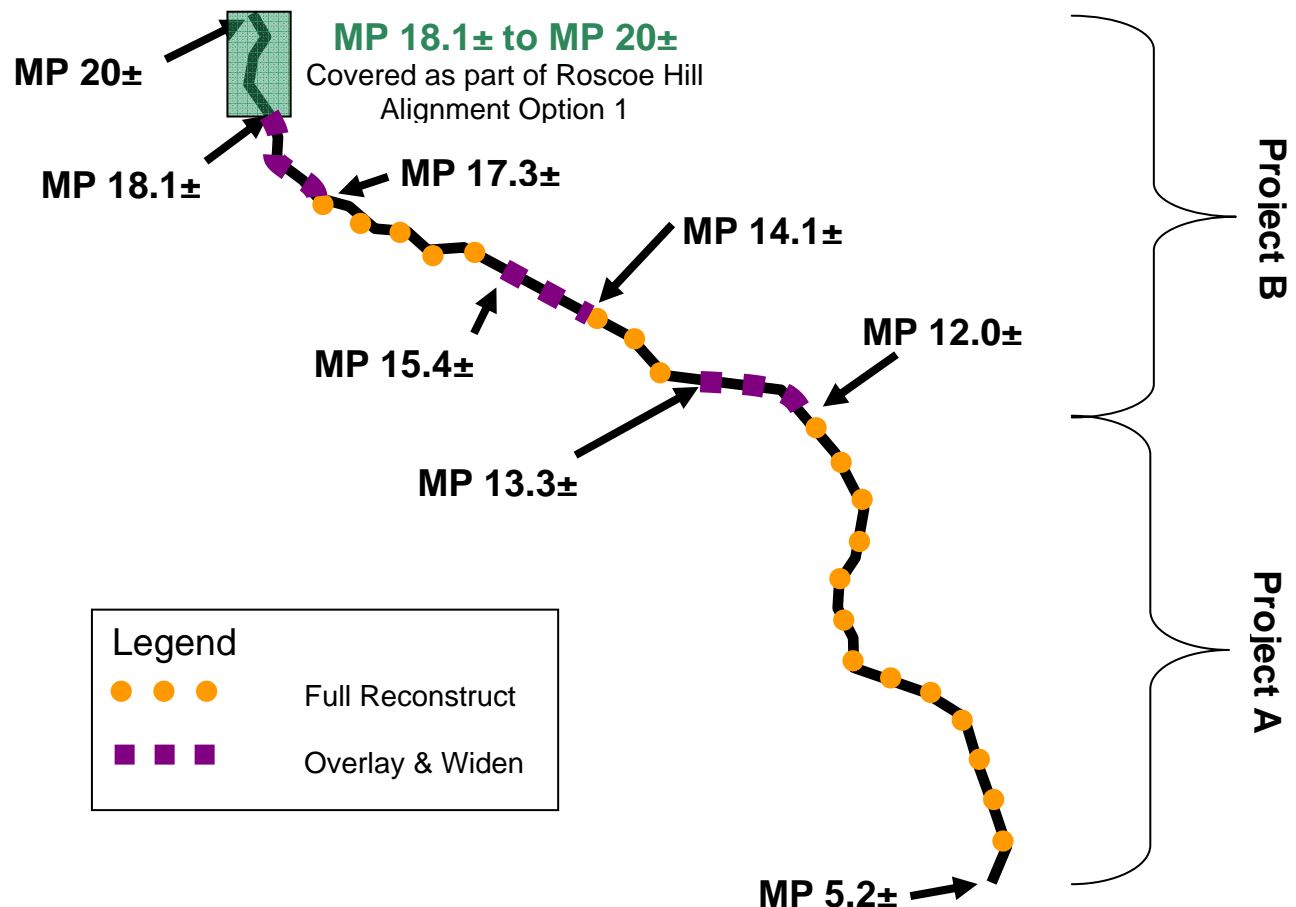
MT 78 Corridor Study

Long Term Improvement Options

Existing roadway conditions were evaluated to determine the minimum level of improvement necessary to upgrade the roadway to improve safety. Over much of the corridor, full reconstruction is necessary to satisfy this goal. Two long-term improvement options were identified.

Project A involves full reconstruction from MP 5.2± to MP 12.0±.

Project B involves full reconstruction from MP12.0± through the end of the corridor. Additionally, Project B includes Roscoe Hill, located at the far northern part of the corridor (MP 18.1± to 20.0±), where three possible alignments were investigated. Based on cost estimates, the recommended option is Alignment Option 1, an overlay and widen scenario where minor changes would be made to the vertical curves to provide minimum sight distance. Substandard grades would not be addressed under this option and a design exception would be required.



As shown in the figure above, within the Project B segment there are areas requiring full reconstruction and other areas that can be improved using an overlay and widen scenario. MDT has determined that it is not cost effective to utilize an overlay and widen concept when more than 25 percent of the proposed project requires full reconstruction. Because nearly half of Project B requires full reconstruction, the overlay and widen concept is not recommended. The ultimate improvement strategy for the entire corridor is full reconstruction in the long-term.



MT 78 Corridor Study

Long Term Improvement Option Costs

Project	Improvement Option	Total Estimated Cost (2006 dollars)
Project A		\$17,900,000
Project B	Roscoe Hill Alignment Option 1	\$16,800,000

How Can I Review the Report?

The Draft Plan is available for public review and comment. You may either review the report online at the MT 78 project web site at www.mdt.mt.gov/pubinvolve/mt78corridor/ or request a copy of the report by contacting Darryl James at the phone number and address provided to the right.

How Can I Submit My Comments?

Comments may be submitted in writing at the final public meeting on **Wednesday, August 22, 2007** from **7 p.m. to 9 p.m.** at the **Roscoe Community Center** located on MT 78.

Comments may also be submitted by mail to project consultant Darryl James of HKM Engineering Inc. at P.O. Box 1009, Helena, MT 59624; or they may be submitted online at the MT 78 project web site at www.mdt.mt.gov/pubinvolve/mt78corridor/

Please indicate comments are for the MT 78 Corridor Study and submit comments by **September 24, 2007**.

For more information,
please contact:

Montana Department of Transportation



Bruce Barrett

Billings District Administrator
MDT

424 Morey St.
PO Box 20437
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bbarrett@mt.gov

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djames@hkminc.com

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Appendix C

Letters Received from State and Federal Agencies



**Montana Fish,
Wildlife & Parks**

RECEIVED

OCT 24 2006

ENVIRONMENTAL

October 23, 2006

1420 E. Sixth Avenue
P.O. Box 200701
Helena, Montana 59620-0701

Jean Riley
Montana Department of Transportation
2701 Prospect Avenue
P.O. Box 201001
Helena, Montana 59620-1001

MT 78 Corridor Study
Red Lodge to Roscoe

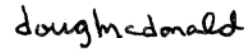
Dear Jean:

The following are comments from Montana Fish, Wildlife & Parks regarding the MT 78 Corridor Study. Additional, more specific comments may be forthcoming as we gather data for each of the drainages that could be affected by a road improvement project.

- a. Development plans should first incorporate a design that avoids direct adverse impacts to these fish and wildlife resources. If conditions are such that direct adverse impacts cannot be avoided, project features should be designed to minimize impacts. Unavoidable adverse impacts may need to be mitigated.
- b. Several ephemeral, intermittent and perennial stream systems cross the study corridor. In general, efforts should be taken during pre-design through construction phases to assure uninterrupted passage of a stream's discharges to maintain the natural channel pattern, dimension and profile and temporal characteristics. There may be instances, however, where it is desirable to create a fish barrier and we will coordinate further with MDT if this is desirable.
- c. Riparian areas, including wildlife/wetland habitat adjacent to these drainages should also be protected to the maximum extent possible. If such areas cannot be avoided or will be notably degraded in scope or quality, they should be mitigated on site and in kind, if possible. This may require MDT to develop procedures that allow the re-establishment of stream systems and riparian areas outside of existing rights-of-way.
- d. Where crossings are necessary, bridges are preferred over culverts as bridges usually result in less adverse impact to a stream's features, functions, dynamic processes and adjacent riparian habitat compared to a culvert. Installation of culverts may or may not require site-specific mitigation. In general, culverts should be embedded and lengths minimized where feasible.
- e. Long culverts, whether the drainage supports a fishery or not, are not preferred because of the potential loss of "open", vegetated, productive segments of a drainage can be lost and undesirable bed degradation or aggradation can be induced. It would be appreciated if road design would consider minimizing overall culvert length through reduction of road prism fill.

Thank you for the opportunity to provide comments at this time. If they are unclear, please contact me at (406) 444-3175. We will provide more specific comments as field data becomes available.

Sincerely,



Doug McDonald
Stream Protection Coordinator
Habitat Protection Bureau/Fisheries

Copy: FWP Region 5 – Jim Darling/Jim Olsen
DEQ – Jeff Ryan
COE – Allan Steinle



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
BILLINGS REGULATORY OFFICE
2602 FIRST AVENUE NORTH, ROOM 309
BILLINGS MT 59101

MASTER FILE
COPY

Please reply to attention of:

August 15, 2006

Billings Regulatory Office
Phone (406) 657-5910
Fax (406) 657-5911

RE: MT 78 Corridor Study
Corps File No. 200690568

Montana Department of Transportation
Attention: Ms. Jean Riley
Post Office Box 201001
Helena, Montana 59620-1001

RECEIVED

AUG 16 2006

ENVIRONMENTAL

Dear Ms. Riley:

Reference is made to your letter regarding the MT 78 Corridor Study from Red Lodge to Roscoe, Montana.


Under the authority of Section 404 of the Clean Water Act, Department of the Army permits are required for the discharge of fill material into waters of the United States. Waters of the United States include the area below the ordinary high water mark of stream channels and lakes or ponds connected to the tributary system, and wetlands adjacent to these waters.

Based on the information provided, the project area may contain jurisdictional waters of the U.S., which may trigger permitting requirements. It is impossible to advise you on likely permitting scenarios without detailed information pertaining to the project corridor and the scope of project impacts.

When final design has been completed, please submit plans and a joint application to this office, along with project drawings and photographs of the proposed sites. Please also include an inventory of aquatic resources, including wetlands that may be affected by this project. The application can be downloaded from <http://www.nwo.usace.army.mil/html/od-rmt/applications.html>, or one can be mailed to you upon request. When the application is complete, a determination will be made as to whether or not authorization will be granted.

If you have any questions, please call me at the Billings office at (406) 657-5910, and reference File No. 200690568.

Sincerely,


Shannon Johnson
Project Manager

Appendix D

Crash Analysis

MT 78 Crash Analysis

Crash rates are a measure of the relative safety of a section of roadway. These rates are most often measured and expressed as the number of reported crashes per million vehicle miles (MVM) traveled over a given section / length of roadway. Crash rates experienced at a particular location can be compared to statewide averages for similar types of roadways and a determination then made regarding the relative safety of that section of roadway. In this report, the crash rate experienced over the MT 78 corridor, considering half mile segments at one-tenth mile increments of roadway, is compared to the statewide average for Primary Highways.

Statewide Crash Rates for State Primary Highways

	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	Average 1995- 2004
State Primary Crash Rate	1.33	1.44	1.46	1.48	1.54	1.54	1.56	1.55	1.74	1.38	1.502

The statewide average crash rate for state primaries over the period 1995 to 2004 is 1.502 crashes per MVM. The annual average daily traffic (AADT) for the MT 78 segment from MP 5.0 to MP 19.0 during the period January 1, 1995 to December 31, 2005 was 742 vehicles per day. The annual average daily traffic (AADT) for the MT 78 segment from MP 4.0 to MP 20.0 during the period January 1, 2005 to December 31, 2005 was 994 vehicles per day. In calculating the average number of crashes per half mile below, the highest (and therefore most conservative) measure of AADT was used.

$$\begin{array}{ccccccc} 994 & & & & & & \\ \text{vehicles} & & & & & & \\ \text{per day} & \times & 365 \text{ days} & \times & 10 & \times & 0.5 \\ & & \text{per year} & & \text{years} & & \text{miles} \\ & & & & & & = & 1,814,050 \\ & & & & & & & \text{vehicle miles} \end{array}$$

$$\begin{array}{ccc} 1,814,050 & & \\ \text{vehicle} & = & 1.814050 \text{ million vehicle miles} \\ \text{miles} & & \text{for 10 year period} \end{array}$$

$$\begin{array}{ccccc} \times & & & & \\ \text{crashes} & / & 1.814050 \text{ million vehicle miles} & = & 1.502 \text{ crashes} \\ & & & & \text{per MVM} \end{array}$$

$$\begin{array}{ccc} \times & = & 2.7247 \\ & & \text{crashes} \end{array}$$

In order to illustrate crash concentrations, the statewide average number of crashes per half mile was rounded up to the next whole number. Accordingly, the term “crash concentration” is defined in this context as three or more crashes per half-mile segment for the period 1995 to 2004. Crash data for the entire corridor was reviewed by half-mile segments every tenth of a mile. The following table lists half-mile segments with three or more crashes recorded between January 1, 1995 and December 31, 2004.

MP	# Crashes	Total Crashes in ½ mile segment
4.9	1	4
5.1	3	
5.1	3	16
5.4	1	
5.5	6	
5.6	6	
5.6	6	10
5.7	2	
5.8	1	
6.1	1	
6.1	1	8
6.2	2	
6.3	1	
6.4	1	
6.5	2	
6.6	1	
6.6	1	10
6.8	2	
6.9	6	
7.0	1	
7.0	1	4
7.4	2	
7.5	1	
7.4	2	5
7.5	1	
7.6	1	
7.8	1	
7.6	1	3
7.8	1	
8.1	1	
7.8	1	4
8.1	1	
8.2	1	
8.3	1	

MP	# Crashes	Total Crashes in ½ mile segment
8.3	1	3
8.7	2	
8.7	2	4
8.9	1	
9.2	1	
9.2	1	3
9.4	1	
9.5	1	
12.1	1	3
12.3	1	
12.4	1	
12.4	1	5
12.6	1	
12.9	3	
13.4	1	4
13.7	2	
13.9	1	
16.3	2	5
16.4	1	
16.5	1	
16.6	1	
17.5	1	3
17.6	1	
17.8	1	
18.6	1	3
18.7	1	
18.9	1	
18.9	1	3
19.1	2	
19.1	2	3
19.5	1	

MP	# Crashes	Total Crashes in ½ mile segment
19.5	1	4
19.9	3	
19.9	2	4
20.0	2	

Appendix E

Detailed Costs and Cost Derivations

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Project A Reconstruct MP 5.2 to MP 12.0
(6.8 miles; 359.04 Sta.)

	Item	Quantity	Units	Price #	Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	\$1,087,801.00	\$ 1,087,801.00
2	Excavation - Unclassified	880,500	CY	\$ 4.07	\$ 3,583,635.00
3	Crushed Aggregate Course	359.04	Sta.	\$ 3,435.00	\$ 1,233,302.00
4	Plant Mix Bituminous Surfacing	359.04	Sta.	\$ 5,300.00	\$ 1,902,912.00
5	Seal & Cover	359.04	Sta.	\$ 392.00	\$ 140,744.00
6	Drainage	359.04	Sta.	\$ 1,650.00	\$ 592,416.00
7	Signing / Markings	359.04	Sta.	\$ 450.00	\$ 161,568.00
8	Fencing	359.04	Sta.	\$ 1,010.00	\$ 362,630.00
	Subtotal				\$ 9,065,008.00
	Miscellaneous Items (20%) *				\$ 1,813,002.00
	Structures (Bridges over 20 ft.)				
		0	SF	\$ 130.00	\$ -
	Subtotal				\$10,878,010.00
	Contingency (25%)				\$ 2,719,503.00
	Subtotal Construction Costs				\$13,597,513.00
	Preliminary Engineering (8%)				\$ 1,087,801.00
	Construction Engineering (8%)				\$ 1,087,801.00
	Subtotal Engineering				\$ 2,175,602.00
	Right of Way **				
	Rural Residential	6.9 Acre	\$	10,000.00	\$ 69,000.00
	Rural Agriculture (dry land)	27.8 Acre	\$	1,000.00	\$ 27,800.00
	Rural Agriculture (Irrigated)	11.4 Acre	\$	7,000.00	\$ 79,800.00
	Subtotal R/W				\$ 176,600.00
	Total Estimated Cost				\$15,949,715.00

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Project B Reconstruct MP 12.0 to MP 20.0; Existing Horiz. Align.
Option 1 (8.0 miles; 422.4 Sta.)

	Item	Quantity	Units	Price #	Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	\$1,014,264.00	\$ 1,014,264.00
2	Excavation - Unclassified	557,500	CY	\$ 4.07	\$ 2,269,025.00
3	Crushed Aggregate Course	422.40	Sta.	\$ 3,435.00	\$ 1,450,944.00
4	Plant Mix Bituminous Surfacing	422.40	Sta.	\$ 5,300.00	\$ 2,238,720.00
5	Seal & Cover	422.40	Sta.	\$ 392.00	\$ 165,581.00
6	Drainage	422.40	Sta.	\$ 1,650.00	\$ 696,960.00
7	Signing / Markings	422.40	Sta.	\$ 450.00	\$ 190,080.00
8	Fencing	422.40	Sta.	\$ 1,010.00	\$ 426,624.00
Subtotal					\$ 8,452,198.00
Miscellaneous Items (20%) *					\$ 1,690,440.00
Structures (Bridges over 20 ft.)					
		0	SF	\$ 130.00	\$ -
Subtotal					\$10,142,638.00
Contingency (25%)					\$ 2,535,660.00
Subtotal Construction Costs					\$12,678,298.00
Preliminary Engineering (8%)					\$ 1,014,264.00
Construction Engineering (8%)					\$ 1,014,264.00
Subtotal Engineering					\$ 2,028,528.00
Right of Way **					
	Rural Residential	6.8	Acre	\$ 10,000.00	\$ 68,000.00
	Rural Agriculture (dry land)	5.8	Acre	\$ 1,000.00	\$ 5,800.00
	Rural Agriculture (Irrigated)	35.4	Acre	\$ 7,000.00	\$ 247,800.00
Subtotal R/W					\$ 321,600.00
Total Estimated Cost					\$15,028,426.00

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Project B Reconstruct MP 12.0 to MP 20.0; Revised Vert. Align. @ Roscoe Hill
Option 2 (8.0 miles; 422.4 Sta.)

	Item	Quantity	Units	Price #	Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	\$2,977,576.00	\$ 2,977,576.00
2	Excavation - Unclassified	4,095,000	CY	\$ 4.07	\$16,666,650.00
3	Crushed Aggregate Course	422.40	Sta.	\$ 3,435.00	\$ 1,450,944.00
4	Plant Mix Bituminous Surfacing	422.40	Sta.	\$ 5,300.00	\$ 2,238,720.00
5	Seal & Cover	422.40	Sta.	\$ 392.00	\$ 165,581.00
6	Drainage	422.40	Sta.	\$ 1,650.00	\$ 696,960.00
7	Signing / Markings	422.40	Sta.	\$ 450.00	\$ 190,080.00
8	Fencing	422.40	Sta.	\$ 1,010.00	\$ 426,624.00
Subtotal					\$24,813,135.00
Miscellaneous Items (20%) *					\$ 4,962,627.00
Structures (Bridges over 20 ft.)					
			SF	\$ 130.00	\$ -
Subtotal					\$29,775,762.00
Contingency (25%)					\$ 7,443,941.00
Subtotal Construction Costs					\$37,219,703.00
Preliminary Engineering (8%)					\$ 2,977,576.00
Construction Engineering (8%)					\$ 2,977,576.00
Subtotal Engineering					\$ 5,955,152.00
Right of Way **					
	Rural Residential	7.2	Acre	\$ 10,000.00	\$ 72,000.00
	Rural Agriculture (dry land)	16.4	Acre	\$ 1,000.00	\$ 16,400.00
	Rural Agriculture (Irrigated)	39.2	Acre	\$ 7,000.00	\$ 274,400.00
Subtotal R/W					\$ 362,800.00
Total Estimated Cost					\$43,537,655.00

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Project B Reconstruct MP 12.0 to MP 20.71; Revised Horiz. Align. MP 18.25 - 20.71
Option 3 Including 1,850 ft. of connecting roadway (8.71 miles; Sta.459.9)

	Item	Quantity	Units	Price #	Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	\$1,573,544.00	\$ 1,573,544.00
2	Excavation - Unclassified	1,288,500	CY	\$ 4.07	\$ 5,244,195.00
3	Crushed Aggregate Course	459.90	Sta.	\$ 3,435.00	\$ 1,579,757.00
4	Plant Mix Bituminous Surfacing	459.90	Sta.	\$ 5,300.00	\$ 2,437,470.00
5	Seal & Cover	459.90	Sta.	\$ 392.00	\$ 180,281.00
6	Drainage	459.90	Sta.	\$ 1,650.00	\$ 758,835.00
7	Signing / Markings	459.90	Sta.	\$ 450.00	\$ 206,955.00
8	Fencing	459.90	Sta.	\$ 1,010.00	\$ 464,499.00
Subtotal					\$12,445,536.00
Miscellaneous Items (20%) *					\$ 2,489,107.00
Structures (Bridges over 20 ft.)					
	East Rosebud Creek	6,160	SF	\$ 130.00	\$ 800,800.00
Subtotal					\$15,735,443.00
Contingency (25%)					\$ 3,933,861.00
Subtotal Construction Costs					\$19,669,304.00
Preliminary Engineering (8%)					\$ 1,573,544.00
Construction Engineering (8%)					\$ 1,573,544.00
Subtotal Engineering					\$ 3,147,088.00
Right of Way **					
	Rural Residential	5.6	Acre	\$ 10,000.00	\$ 56,000.00
	Rural Agriculture (dry land)	35.3	Acre	\$ 1,000.00	\$ 35,300.00
	Rural Agriculture (Irrigated)	48.2	Acre	\$ 7,000.00	\$ 337,400.00
Subtotal R/W					\$ 428,700.00
Total Estimated Cost					\$23,245,092.00

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Spot Improvement

RP 7.4

Shave Side Slope for SD

	Item	Quantity	Units	Price #	Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	\$ 6,588.00	\$ 6,588.00
2	Excavation - Unclassified	9,000	CY	\$ 4.07	\$ 36,630.00
3	Crushed Aggregate Course	0.00	Sta.	\$ 3,435.00	\$ -
4	Plant Mix Bituminous Surfacing	0.00	Sta.	\$ 5,300.00	\$ -
5	Seal & Cover	0.00	Sta.	\$ 392.00	\$ -
6	Drainage	0.00	Sta.	\$ 1,650.00	\$ -
7	Signing / Markings	8.00	Sta.	\$ 450.00	\$ 3,600.00
8	Fencing	8.00	Sta.	\$ 1,010.00	\$ 8,080.00
Subtotal					\$ 54,898.00
Miscellaneous Items (20%) *					\$ 10,980.00
Structures (Bridges over 20 ft.)					
		0	SF	\$ 130.00	\$ -
Subtotal					\$ 65,878.00
Contingency (25%)					\$ 16,470.00
Subtotal Construction Costs					\$ 82,348.00
Preliminary Engineering (8%)					\$ 6,588.00
Construction Engineering (8%)					\$ 6,588.00
Subtotal Engineering					\$ 13,176.00
Right of Way **					
	Rural Residential	0	Acre	\$ 10,000.00	\$ -
	Rural Agriculture (dry land)	0.4	Acre	\$ 1,000.00	\$ 400.00
	Rural Agriculture (Irrigated)	0	Acre	\$ 7,000.00	\$ -
Subtotal R/W					\$ 400.00
Total Estimated Cost					\$ 95,924.00

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Spot Improvement

RP 8.0

Shave Side Slope for SD

	Item	Quantity	Units	Price #	Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	\$ 10,913.00	\$ 10,913.00
2	Excavation - Unclassified	15,000	CY	\$ 4.07	\$ 61,050.00
3	Crushed Aggregate Course	0.00	Sta.	\$ 3,435.00	\$ -
4	Plant Mix Bituminous Surfacing	0.00	Sta.	\$ 5,300.00	\$ -
5	Seal & Cover	0.00	Sta.	\$ 392.00	\$ -
6	Drainage	0.00	Sta.	\$ 1,650.00	\$ -
7	Signing / Markings	13.00	Sta.	\$ 450.00	\$ 5,850.00
8	Fencing	13.00	Sta.	\$ 1,010.00	\$ 13,130.00
Subtotal					\$ 90,943.00
Miscellaneous Items (20%) *					\$ 18,189.00
Structures (Bridges over 20 ft.)					
		0	SF	\$ 130.00	\$ -
Subtotal					\$ 109,132.00
Contingency (25%)					\$ 27,283.00
Subtotal Construction Costs					\$ 136,415.00
Preliminary Engineering (8%)					\$ 10,913.00
Construction Engineering (8%)					\$ 10,913.00
Subtotal Engineering					\$ 21,826.00
Right of Way **					
	Rural Residential	0	Acre	\$ 10,000.00	\$ -
	Rural Agriculture (dry land)	0.6	Acre	\$ 1,000.00	\$ 600.00
	Rural Agriculture (Irrigated)	0	Acre	\$ 7,000.00	\$ -
Subtotal R/W					\$ 600.00
Total Estimated Cost					\$ 158,841.00

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Spot Improvement MP 8.2 Upper Luther Road Bus Pullout / County Road Realignment

	Item	Quantity	Units	Price #	Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	\$ 8,906.00	\$ 8,906.00
2	Excavation - Unclassified	3,240	CY	\$ 4.07	\$ 13,187.00
3	Crushed Aggregate Course	1,575.00	CY	\$ 16.41	\$ 25,846.00
4	Plant Mix Bituminous Surfacing	124.00	Ton	\$ 19.27	\$ 2,389.00
5	Asphalt Cement	7.60	Ton	\$ 430.01	\$ 3,268.00
6	Drainage	200.00	FT	\$ 41.20	\$ 8,240.00
7	Signing / Markings	1.00	LS	\$ 2,000.00	\$ 2,000.00
8	Fencing	1.00	LS	\$ 4,880.00	\$ 4,880.00
Subtotal					\$ 68,716.00
Miscellaneous Items (20%) *					\$ 13,743.00
Structures (Bridges over 20 ft.)					
		0	SF	\$ 130.00	\$ -
Subtotal					\$ 82,459.00
Contingency (35%)					\$ 28,861.00
Subtotal Construction Costs					\$ 111,320.00
Preliminary Engineering (8%)					\$ 8,906.00
Construction Engineering (8%)					\$ 8,906.00
Subtotal Engineering					\$ 17,812.00
Right of Way **					
	Rural Residential	0	Acre	\$ 10,000.00	\$ -
	Rural Agriculture (dry land)	0	Acre	\$ 1,000.00	\$ -
	Rural Agriculture (Irrigated)	0.82	Acre	\$ 7,000.00	\$ 5,740.00
Subtotal R/W					\$ 5,740.00
Total Estimated Cost					\$ 134,872.00

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Spot Improvement

RP 9.3

Shave Side Slope for SD

	Item	Quantity	Units	Price #	Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	\$ 55,711.00	\$ 55,711.00
2	Excavation - Unclassified	95,000	CY	\$ 4.07	\$ 386,650.00
3	Crushed Aggregate Course	0.00	Sta.	\$ 3,435.00	\$ -
4	Plant Mix Bituminous Surfacing	0.00	Sta.	\$ 5,300.00	\$ -
5	Seal & Cover	0.00	Sta.	\$ 392.00	\$ -
6	Drainage	0.00	Sta.	\$ 1,650.00	\$ -
7	Signing / Markings	15.00	Sta.	\$ 450.00	\$ 6,750.00
8	Fencing	15.00	Sta.	\$ 1,010.00	\$ 15,150.00
Subtotal					\$ 464,261.00
Miscellaneous Items (20%) *					\$ 92,852.00
Structures (Bridges over 20 ft.)					
		0	SF	\$ 130.00	\$ -
Subtotal					\$ 557,113.00
Contingency (25%)					\$ 139,278.00
Subtotal Construction Costs					\$ 696,391.00
Preliminary Engineering (8%)					\$ 55,711.00
Construction Engineering (8%)					\$ 55,711.00
Subtotal Engineering					\$ 111,422.00
Right of Way **					
	Rural Residential	0	Acre	\$ 10,000.00	\$ -
	Rural Agriculture (dry land)	1.3	Acre	\$ 1,000.00	\$ 1,300.00
	Rural Agriculture (Irrigated)	0	Acre	\$ 7,000.00	\$ -
Subtotal R/W					\$ 1,300.00
Total Estimated Cost					\$ 809,113.00

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Spot Improvement MP 13.0 Lower Luther Road Bus Pullout / County Road Realignment

	Item	Quantity	Units	Price #	Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	\$ 9,675.00	\$ 9,675.00
2	Excavation - Unclassified	3,630	CY	\$ 4.07	\$ 14,774.00
3	Crushed Aggregate Course	1,740.00	CY	\$ 16.41	\$ 28,553.00
4	Plant Mix Bituminous Surfacing	124.00	Ton	\$ 19.27	\$ 2,389.00
5	Asphalt Cement	7.60	Ton	\$ 430.01	\$ 3,268.00
6	Drainage	200.00	FT	\$ 41.20	\$ 8,240.00
7	Signing / Markings	1.00	LS	\$ 2,000.00	\$ 2,000.00
8	Fencing	1.00	LS	\$ 5,755.00	\$ 5,755.00
Subtotal					\$ 74,654.00
Miscellaneous Items (20%) *					\$ 14,931.00
Structures (Bridges over 20 ft.)					
		0	SF	\$ 130.00	\$ -
Subtotal					\$ 89,585.00
Contingency (35%)					\$ 31,355.00
Subtotal Construction Costs					\$ 120,940.00
Preliminary Engineering (8%)					\$ 9,675.00
Construction Engineering (8%)					\$ 9,675.00
Subtotal Engineering					\$ 19,350.00
Right of Way **					
	Rural Residential	0.4	Acre	\$ 10,000.00	\$ 4,000.00
	Rural Agriculture (dry land)	0	Acre	\$ 1,000.00	\$ -
	Rural Agriculture (Irrigated)	0.25	Acre	\$ 7,000.00	\$ 1,750.00
Subtotal R/W					\$ 5,750.00
Total Estimated Cost					\$ 146,040.00

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Spot Improvement RP 15.8 Shave Side Slope for SD

	Item	Quantity	Units	Price #	Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	\$ 44,255.00	\$ 44,255.00
2	Excavation - Unclassified	74,000	CY	\$ 4.07	\$ 301,180.00
3	Crushed Aggregate Course	0.00	Sta.	\$ 3,435.00	\$ -
4	Plant Mix Bituminous Surfacing	0.00	Sta.	\$ 5,300.00	\$ -
5	Seal & Cover	0.00	Sta.	\$ 392.00	\$ -
6	Drainage	0.00	Sta.	\$ 1,650.00	\$ -
7	Signing / Markings	16.00	Sta.	\$ 450.00	\$ 7,200.00
8	Fencing	16.00	Sta.	\$ 1,010.00	\$ 16,160.00
Subtotal					\$ 368,795.00
Miscellaneous Items (20%) *					\$ 73,759.00
Structures (Bridges over 20 ft.)					
		0	SF	\$ 130.00	\$ -
Subtotal					\$ 442,554.00
Contingency (25%)					\$ 110,639.00
Subtotal Construction Costs					\$ 553,193.00
Preliminary Engineering (8%)					\$ 44,255.00
Construction Engineering (8%)					\$ 44,255.00
Subtotal Engineering					\$ 88,510.00
Right of Way **					
	Rural Residential	0	Acre	\$ 10,000.00	\$ -
	Rural Agriculture (dry land)	1.5	Acre	\$ 1,000.00	\$ 1,500.00
	Rural Agriculture (Irrigated)	0	Acre	\$ 7,000.00	\$ -
Subtotal R/W					\$ 1,500.00
Total Estimated Cost					\$ 643,203.00

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

MT 78 CORRIDOR STUDY
Planning Level Alternatives Costing

Spot Improvement RP 16.8 Shave Side Slope for SD

	Item	Quantity	Units	Price #	Cost
1	Mobilization (@ ~ 8% Const.)	1.00	LS	\$ 68,078.00	\$ 68,078.00
2	Excavation - Unclassified	118,000	CY	\$ 4.07	\$ 480,260.00
3	Crushed Aggregate Course	0.00	Sta.	\$ 3,435.00	\$ -
4	Plant Mix Bituminous Surfacing	0.00	Sta.	\$ 5,300.00	\$ -
5	Seal & Cover	0.00	Sta.	\$ 392.00	\$ -
6	Drainage	0.00	Sta.	\$ 1,650.00	\$ -
7	Signing / Markings	13.00	Sta.	\$ 450.00	\$ 5,850.00
8	Fencing	13.00	Sta.	\$ 1,010.00	\$ 13,130.00
Subtotal					\$ 567,318.00
Miscellaneous Items (20%) *					\$ 113,464.00
Structures (Bridges over 20 ft.)					
		0	SF	\$ 130.00	\$ -
Subtotal					\$ 680,782.00
Contingency (25%)					\$ 170,196.00
Subtotal Construction Costs					\$ 850,978.00
Preliminary Engineering (8%)					\$ 68,078.00
Construction Engineering (8%)					\$ 68,078.00
Subtotal Engineering					\$ 136,156.00
Right of Way **					
	Rural Residential	0	Acre	\$ 10,000.00	\$ -
	Rural Agriculture (dry land)	1.8	Acre	\$ 1,000.00	\$ 1,800.00
	Rural Agriculture (Irrigated)	0	Acre	\$ 7,000.00	\$ -
Subtotal R/W					\$ 1,800.00
Total Estimated Cost					\$ 988,934.00

* Includes Survey, Remove Structures, Topsoil, Seeding, Traffic Control, Erosion Control, Guardrail, Cattle Guards, Geotextiles, Shoulder Widening, Mailboxes, etc.

Unit costs based on Jan. - Dec. 2006 MDT English Average Bid Prices

** Right of Way Costs based on recent MDT acquisitions (Absarokee - North & South).

Costs do not include Utility Relocation Costs or Environmental Mitigation Costs.

	MP 5.2 -12.0 Project A	MP 12.0 -20.0 Project B Option 1	MP 12.0 -20.0 Project B Option 2	MP 12.0 -20.7 Project B Option 3	Spot Improvement MP 7.4 Slope	Spot Improvement MP 8.0 Slope	Upper Luther MP 8.2 Bus Pull Out	Spot Improvement MP 9.3 Slope	Lower Luther MP 13.0 Bus Pull Out	Spot Improvement MP 13.0 Vegetation	Spot Improvement MP 15.8 Slope	Spot Improvement MP 16.8 Slope	School Bus Stop Signing/Location
2006 Estimated Const. Cost	\$15,949,715	\$ 15,028,426	\$ 43,537,655	\$ 23,245,092	\$ 95,924	\$ 158,841	\$ 134,872	\$ 809,113	\$ 146,040	\$ 2,500	\$ 643,203	\$ 988,934	\$ 1,000*
Indirect Costs (@12%)	\$ 1,913,966	\$ 1,803,411	\$ 5,224,519	\$ 2,789,411	\$ 11,511	\$ 19,061	\$ 16,185	\$ 97,094	\$ 17,525	\$ 300	\$ 77,184	\$ 118,672	\$ 120
Year 2006 Estimate	\$17,863,681	\$ 16,831,837	\$ 48,762,174	\$ 26,034,503	\$ 107,435	\$ 177,902	\$ 151,057	\$ 906,207	\$ 163,565	\$ 2,800	\$ 720,387	\$ 1,107,606	\$ 1,120
Inflation at 3% Annually to Year 2011	\$18,490,091	\$ 17,422,065	\$ 50,472,075	\$ 26,947,433	\$ 111,202	\$ 184,140	\$ 156,354	\$ 937,984	\$ 169,300	\$ 2,898	\$ 745,649	\$ 1,146,446	\$ 1,159
Indirect Costs (@12%)	\$ 2,218,811	\$ 2,090,648	\$ 6,056,649	\$ 3,233,692	\$ 13,344	\$ 22,097	\$ 18,762	\$ 112,558	\$ 20,316	\$ 348	\$ 89,478	\$ 137,573	\$ 139
Year 2011 Estimate	\$20,708,902	\$ 19,512,713	\$ 56,528,724	\$ 30,181,125	\$ 124,546	\$ 206,237	\$ 175,116	\$ 1,050,542	\$ 189,616	\$ 3,246	\$ 835,127	\$ 1,284,019	\$ 1,298
Inflation at 3% Annually to Year 2016	\$21,435,083	\$ 20,196,948	\$ 58,510,968	\$ 31,239,460	\$ 128,914	\$ 213,469	\$ 181,257	\$ 1,087,380	\$ 196,266	\$ 3,360	\$ 864,411	\$ 1,329,045	\$ 1,344
Indirect Costs (@12%)	\$ 2,572,210	\$ 2,423,634	\$ 7,021,316	\$ 3,748,735	\$ 15,470	\$ 25,616	\$ 21,751	\$ 130,486	\$ 23,552	\$ 403	\$ 103,729	\$ 159,485	\$ 161
Year 2016 Estimate	\$24,007,293	\$ 22,620,582	\$ 65,532,284	\$ 34,988,195	\$ 144,384	\$ 239,085	\$ 203,008	\$ 1,217,866	\$ 219,818	\$ 3,763	\$ 968,140	\$ 1,488,530	\$ 1,505
Inflation at 3% Annually to Year 2021	\$24,849,136	\$ 23,413,798	\$ 67,830,248	\$ 36,215,096	\$ 149,446	\$ 247,469	\$ 210,126	\$ 1,260,572	\$ 227,526	\$ 3,895	\$ 1,002,089	\$ 1,540,727	\$ 1,558
Indirect Costs (@12%)	\$ 2,981,896	\$ 2,809,656	\$ 8,139,630	\$ 4,345,812	\$ 17,934	\$ 29,696	\$ 25,215	\$ 151,269	\$ 27,303	\$ 467	\$ 120,251	\$ 184,887	\$ 187
Year 2021 Estimate	\$27,831,032	\$ 26,223,454	\$ 75,969,878	\$ 40,560,908	\$ 167,380	\$ 277,165	\$ 235,341	\$ 1,411,841	\$ 254,829	\$ 4,362	\$ 1,122,340	\$ 1,725,614	\$ 1,745
Inflation at 3% Annually to Year 2026	\$28,806,959	\$ 27,143,009	\$ 78,633,848	\$ 41,983,222	\$ 173,249	\$ 286,885	\$ 243,594	\$ 1,461,348	\$ 263,764	\$ 4,515	\$ 1,161,696	\$ 1,786,125	\$ 1,806
Indirect Costs (@12%)	\$ 3,456,835	\$ 3,257,161	\$ 9,436,062	\$ 5,037,987	\$ 20,790	\$ 34,426	\$ 29,231	\$ 175,362	\$ 31,652	\$ 542	\$ 139,404	\$ 214,335	\$ 217
Year 2026 Estimate	\$32,263,794	\$ 30,400,170	\$ 88,069,910	\$ 47,021,209	\$ 194,039	\$ 321,311	\$ 272,825	\$ 1,636,710	\$ 295,416	\$ 5,057	\$ 1,301,100	\$ 2,000,460	\$ 2,023

Cost Derivations

Drainage Cost Derivation

(Based on Columbus - South Reconstruction 9-22-05)

Item	Units (m)	Units (Ft.)	Unit Price	Item Cost
18" Drain	668.5	2193.24	\$ 37.21	\$ 81,610.52
24" Drain	534.0	1751.97	\$ 61.01	\$ 106,887.60
30" Drain	250.5	821.85	\$ 70.33	\$ 57,800.74
36" Drain	94.5	310.04	\$ 97.11	\$ 30,107.92
42" Drain	23.5	77.10	\$ 105.00	\$ 8,095.47
48" Drain	42.5	139.44	\$ 125.00	\$ 17,429.46
8 ft. CSP	31.5	103.35	\$ 250.00	\$ 25,836.61
10 ft. CSP Irr.	51.0	167.32	\$ 450.00	\$ 75,295.28
18" RCP Irr.	773.5	2537.73	\$ 47.00	\$ 119,273.29
24" RCP Irr.	288.0	944.88	\$ 50.00	\$ 47,244.09
30" RCP Irr.	52.0	170.60	\$ 122.00	\$ 20,813.65
6' x 3' RCB	100.0	328.08	\$ 450.00	\$ 147,637.80

Drainage Cost (14.2 km; 8.8 miles) \$ 738,032.43

Drainage Cost / Mile \$ 83,867.32

Infl. @ 3%

Drainage Cost / Station \$ 1,588.40

\$1,636.05

Use \$1,650 / Sta.

Signing / Marking Cost Derivation

(Based on Columbus - South Reconstruction 9-22-05)

Item	Units (m)	Units (E)	Unit Price	Item Cost	
Temp Markings	29.5	18.33	\$ 151.36	\$	2,774.43
Signs -Al. Sht. Inc. - I	7.4	80.00	\$ 24.52	\$	1,961.60
Signs - Sht. Al. - I	185.0	1991.00	\$ 25.48	\$	50,730.68
Signs - Sht. Al. - III	195.0	2099.00	\$ 23.00	\$	48,277.00
Posts - Stl. U	89.1	196.00	\$ 5.50	\$	1,078.00
Posts - Structural Stl.	257.8	568.00	\$ 4.75	\$	2,698.00
Posts - Trtd Timber 4"	162.4	532.81	\$ 12.11	\$	6,452.31
Posts - Trtd Timber 5"	14.1	46.26	\$ 12.26	\$	567.15
Frang Brkwy	2.0	2.00	\$ 850.00	\$	1,700.00
Delineators	421.0	421.00	\$ 26.00	\$	10,946.00
Remove Signs	108.0	108.00	\$ 165.00	\$	17,820.00
Striping - White Pnt.	1145.0	303.00	\$ 26.00	\$	7,878.00
Striping - Yellow Pnt.	609.0	161.00	\$ 26.00	\$	4,186.00
Striping - White Epoxy	892.0	236.00	\$ 59.00	\$	13,924.00
Striping - Yellow Epoxy	1940.0	513.00	\$ 59.00	\$	30,267.00
Signing / Marking Cost (14.2 km; 8.8 miles)				\$	201,260.16
Signing / Marking Cost / Mile				\$	22,870.47
Signing / Marking Cost / Station				\$	433.15
					Infl. @ 3%
				\$	446.15
Use \$450 / Sta.					

Fencing Cost Derivation

(Based on Columbus - South Reconstruction 9-22-05)

Item	Units (m)	Units (E)	Unit Price	Item Cost	
Farm Fence - F4W	3671.0	12043.96	\$ 2.30	\$ 27,701.12	
Farm Fence - F4M	190.8	625.98	\$ 2.30	\$ 1,439.76	
Farm Fence - F5W	1543.0	5062.34	\$ 2.30	\$ 11,643.37	
Farm Fence - F5M	11768.1	38609.25	\$ 2.30	\$ 88,801.28	
Farm Fence - F6W	527.2	1729.66	\$ 2.30	\$ 3,978.22	
Fence - Special Design	65.2	213.91	\$ 14.00	\$ 2,994.75	
Single Panel	466.0	466.00	\$ 150.00	\$ 69,900.00	
Double Panel	336.0	336.00	\$ 200.00	\$ 67,200.00	
Farm Gate G2	212.2	696.19	\$ 8.58	\$ 5,973.35	
Farm Gate G3	162.3	532.48	\$ 20.00	\$ 10,649.61	
Temporary Fence	14200.0	46587.93	\$ 1.25	\$ 58,234.91	
Farm Fence WW	10462.0	34324.15	\$ 3.00	\$ 102,972.44	
Deadman	85.0	85.00	\$ 35.00	\$ 2,975.00	
				\$ -	
				\$ -	
Fencing Cost (14.2 km; 8.8 miles)				\$ 454,463.80	
Fencing Cost / Mile				\$ 51,643.61	
					Infl. @ 3%
Fencing Cost / Station				\$ 978.10	\$1,007.44
				Use \$1,010 / Sta.	

Surfacing Cost Derivation

(based on 0.45 PMBS and 1.25 CAC [both assumed] and Billings District Standard Units)

Assumes 12 ft. lanes and 3 ft. shoulder to accommodate a future overlay

Costs based on Jan. thru Dec. MDT English Bid Tabs)

		Unit Cost	Cost / Sta.	Estimated Cost	Use
PMBS	115.3 Tons / Sta.	\$ 19.27	\$2,221.83	\$ 5,298.19	\$5,300.00
AC	6.92 Tons / Sta.	\$ 430.01	\$2,975.67	#	
Tack	20.3 Gal / Sta.	\$ 2.48	\$ 50.34	#	
AggregateTack	20.3 Gal / Sta.	\$ 2.48	\$ 50.34	#	
CAC	209.3 CY / Sta.	\$ 16.41	\$3,434.61	\$ 3,434.61	\$3,435.00
Cover	334 SY / Sta.	\$ 0.44	\$ 146.96	\$ 392.08	\$ 392.00
Seal Oil	0.57 Tons / Sta.	\$ 430.04	\$ 245.12	#	

Combined with previous item

Appendix F

Access Management Study Recommendations

(Between MP 5.0± and MP 20.0±)

Mile Post (+/-)	Side	Approach Reference	Access Type	Access Recommendation
5.1	LT	MP05A-LT	Farm Field	RELOCATE TO ALIGN WITH MP05B-RT
5.1	RT	MP05B-RT	RESIDENTIAL	RELOCATE TO ALIGN WITH MP05A-LT
5.1	LT	MP05C-LT	RESIDENTIAL	RELOCATE TO ALIGN WITH MP05D-RT
5.2	RT	MP05D-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP05C-LT
5.3	LT	MP05E-LT	FARM FIELD	NO RECOMMENDATION
5.6	RT	MP05F-RT	FARM FIELD	NO RECOMMENDATION
5.6	RT	MP05G-RT	FARM FIELD	RECOMMEND CLOSING
5.8	RT	MP05H-RT	FARM FIELD	NO RECOMMENDATION
5.9	RT	MP05I-RT	FARM FIELD	NO RECOMMENDATION
6.1	LT	MP06A-LT	FARM FIELD	NO RECOMMENDATION
6.3	RT	MP06B-RT	FARM FIELD	NO RECOMMENDATION
6.4	RT	MP06C-RT	FARM FIELD	NO RECOMMENDATION
6.5	LT	MP06E-LT	FARM FIELD	NO RECOMMENDATION
6.7	RT	MP06D-RT	RESIDENTIAL	NO RECOMMENDATION
6.7	LT	MP06F-LT	FARM FIELD	NO RECOMMENDATION
6.8	LT	MP06G-LT	FARM FIELD	NO RECOMMENDATION
6.9	RT	MP06H-RT	RESIDENTIAL	NO RECOMMENDATION
6.9	LT	MP06I-LT	FARM FIELD	NO RECOMMENDATION
7.0	RT	MP07A-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP07B-LT AT STA 114+90
7.0	LT	MP07B-LT	FARM FIELD	NO RECOMMENDATION
7.1	LT	MP07C-LT	FARM FIELD	COMBINE WITH MP07D-LT
7.1	LT	MP07D-LT	FARM FIELD	COMBINE WITH MP07C-LT
7.1	RT	MP07E-RT	FARM FIELD	COMBINE WITH MP07F-RT
7.2	RT	MP07F-RT	FARM FIELD	COMBINE WITH MP07E-RT
7.4	RT	MP07G-RT	FARM FIELD	NO RECOMMENDATION
7.5	LT	MP07H-LT	FARM FIELD	NO RECOMMENDATION
7.5	RT	MP07I-RT	FARM FIELD	NO RECOMMENDATION
7.7	RT	MP07J-RT	FARM FIELD	NO RECOMMENDATION
7.7	LT	MP07K-LT	PUBLIC	NO RECOMMENDATION
7.8	RT	MP07L-RT	RESIDENTIAL	NO RECOMMENDATION
7.9	LT	MP07M-LT	RESIDENTIAL	NO RECOMMENDATION
7.9	RT	MP07N-RT	OTHER	NO RECOMMENDATION
7.9	LT	MP07O-LT	FARM FIELD	NO RECOMMENDATION
8.0	RT	MP08A-RT	FARM FIELD	NO RECOMMENDATION
8.1	RT	MP08B-RT	FARM FIELD	NO RECOMMENDATION
8.1	LT	MP08C-LT	FARM FIELD	NO RECOMMENDATION
8.2	LT	MP08D-LT	PUBLIC	REALIGN APPROACH PERPENDICULAR TO P-78
8.8	RT	MP08E-RT	FARM FIELD	NO RECOMMENDATION
8.8	LT	MP08F-LT	RESIDENTIAL/SHARED	NO RECOMMENDATION
8.9	RT	MP08G-RT	FARM FIELD	NO RECOMMENDATION
8.9	LT	MP08H-LT	FARM FIELD	RECOMMEND CLOSING
9.2	LT	MP09A-LT	RESIDENTIAL	NO RECOMMENDATION
9.2	RT	MP09B-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP09A-LT AT STA 150+00
9.5	LT	MP09C-LT	FARM FIELD	NO RECOMMENDATION
9.7	LT	MP09D-LT	FARM FIELD	NO RECOMMENDATION
9.8	RT	MP09E-RT	FARM FIELD	NO RECOMMENDATION
9.9	LT	MP09F-LT	RESIDENTIAL/SHARED	NO RECOMMENDATION
9.9	RT	MP09G-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP09F-LT AT STA 160+40
10.0	RT	MP10A-RT	RESIDENTIAL	RELOCATE TO ALIGN WITH MP10B-LT AT STA 162+10
10.0	LT	MP10B-LT	FARM FIELD	NO RECOMMENDATION
10.1	RT	MP10C-RT	FARM FIELD	NO RECOMMENDATION
10.1	LT	MP10D-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP10C-RT AT STA 164+20
10.3	RT	MP10E1-RT	FARM FIELD	COMBINE WITH MP10C-RT OR MP10E2-RT
10.4	RT	MP10E2-RT	RESIDENTIAL	NO RECOMMENDATION
10.4	LT	MP10F-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP10E-RT

Mile Post (+/-)	Side	Approach Reference	Access Type	Access Recommendation
10.5	LT	MP10H-LT	FARM FIELD	NO RECOMMENDATION
10.7	LT	MP10G-LT	RESIDENTIAL	NO RECOMMENDATION
11.0	RT	MP11A-RT	PUBLIC	NO RECOMMENDATION
11.2	RT	MP11C-RT	FARM FIELD	NO RECOMMENDATION
11.3	LT	MP11B-LT	FARM FIELD	NO RECOMMENDATION
11.5	RT	MP11D-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP11E-LT
11.5	LT	MP11E-LT	FARM FIELD/SHARED	RELOCATE TO ALIGN WITH MP11D-RT
11.6	LT	MP11F-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP11G-RT AT STA 190+10
11.7	RT	MP11G-RT	RESIDENTIAL	NO RECOMMENDATION
11.8	RT	MP11H-RT	RESIDENTIAL	NO RECOMMENDATION
11.8	LT	MP11I-LT	RESIDENTIAL	RELOCATE TO ALIGN WITH MP11H-RT AT STA 192+20
12.0	LT	MP12A-LT	FARM FIELD	NO RECOMMENDATION
12.1	LT	MP12C-LT	RESIDENTIAL/SHARED	NO RECOMMENDATION
12.1	RT	MP12B-RT	FARM FIELD	NO RECOMMENDATION
12.2	RT	MP12D-RT	FARM FIELD	NO RECOMMENDATION
12.5	LT	MP12E-LT	FARM FIELD	NO RECOMMENDATION
12.5	RT	MP12F-RT	FARM FIELD	NO RECOMMENDATION
12.7	LT	MP12G-LT	RESIDENTIAL/SHARED	RELOCATE TO ALIGN WITH MP12H-RT
12.7	RT	MP12H-RT	PUBLIC	RELOCATE TO ALIGN WITH MP12G-LT
12.9	LT	MP12I-LT	COMMERCIAL	NO RECOMMENDATION
12.9	LT	MP12J-LT	PUBLIC	NO RECOMMENDATION
13.0	LT	MP13A-LT	RESIDENTIAL	NO RECOMMENDATION
13.1	RT	MP13B-RT	FARM FIELD	NO RECOMMENDATION
13.1	LT	MP13C-LT	RESIDENTIAL	NO RECOMMENDATION
13.2	RT	MP13D-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP13E-LT
13.2	LT	MP13E-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP13D-RT
13.4	RT	MP13F-RT	FARM FIELD	NO RECOMMENDATION
13.4	LT	MP13G-LT	FARM FIELD	NO RECOMMENDATION
13.7	LT	MP13H-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP13I-RT
13.7	RT	MP13I-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP13H-LT
13.8	RT	MP13J-RT	RESIDENTIAL	NO RECOMMENDATION
13.8	LT	MP13K-LT	RESIDENTIAL	NO RECOMMENDATION
14.0	LT	MP14A-LT	FARM FIELD	NO RECOMMENDATION
14.1	RT	MP14B-RT	RESIDENTIAL	NO RECOMMENDATION
14.1	LT	MP14C-LT	FARM FIELD	NO RECOMMENDATION
14.5	LT	MP14D-LT	FARM FIELD	NO RECOMMENDATION
14.8	RT	MP14E-RT	FARM FIELD	NO RECOMMENDATION
14.8	LT	MP14F-LT	FARM FIELD	NO RECOMMENDATION
15.0	LT	MP15A-LT	RESIDENTIAL	NO RECOMMENDATION
15.1	LT	MP15B-LT	RESIDENTIAL	NO RECOMMENDATION
15.2	RT	MP15C-RT	FARM FIELD	NO RECOMMENDATION
15.3	LT	MP15D-LT	RESIDENTIAL/SHARED	NO RECOMMENDATION
15.3	RT	MP15E-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP15D-LT AT STA 249+35
15.5	LT	MP15F-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP15G-RT AT STA 252+55
15.5	RT	MP15G-RT	FARM FIELD	NO RECOMMENDATION
15.8	RT	MP15H-RT	FARM FIELD	NO RECOMMENDATION
15.8	LT	MP15I-LT	FARM FIELD	NO RECOMMENDATION
16.0	RT	MP16A-RT	PUBLIC	NO RECOMMENDATION
16.0	LT	MP16B-LT	FARM FIELD	NO RECOMMENDATION
16.1	LT	MP16C-LT	RESIDENTIAL	NO RECOMMENDATION
16.2	RT	MP16D-RT	COMMERCIAL	REMOVE DUE TO CHANGE IN USE WITH NEW OWNERS; ALTERNATIVE ACCESS AVAILABLE FROM BUTCHER CREEK ROAD
16.3	LT	MP16E-LT	FARM FIELD	NO RECOMMENDATION
16.3	RT	MP16F-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP16G-LT AT STA 264+80

Mile Post (+/-)	Side	Approach Reference	Access Type	Access Recommendation
16.3	LT	MP16G-LT	FARM FIELD	NO RECOMMENDATION
16.4	RT	MP16H-RT	FARM FIELD	COMBINE WITH APPROACH MP16I-RT AND CENTER ON FENCELINE
16.4	RT	MP16I-RT	FARM FIELD	COMBINE WITH APPROACH MPH-RT AND CENTER ON FENCELINE
16.6	RT	MP16J-RT	FARM FIELD	NO RECOMMENDATION
16.6	LT	MP16K-LT	FARM FIELD	NO RECOMMENDATION
16.6	LT	MP16L-LT	FARM FIELD	COMBINE APPROACH WITH MP16K-LT AT STA 268+80
16.8	LT	MP16M-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP16N-RT
16.9	RT	MP16N-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP16M-LT
17.0	RT	MP17A-RT	RESIDENTIAL	NO RECOMMENDATION
17.4	RT	MP17B-RT	FARM FIELD	RELOCATE TO ALIGN WITH MP17C-LT
17.4	LT	MP17C-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP17B-RT
17.5	RT	MP17D-RT	FARM FIELD	NO RECOMMENDATION
17.5	LT	MP17E-LT	PUBLIC	NO RECOMMENDATION
17.7	RT	MP17F-RT	FARM FIELD	NO RECOMMENDATION
17.9	RT	MP17G-RT	FARM FIELD	NO RECOMMENDATION
18.0	LT	MP18A-LT	FARM FIELD	RELOCATE TO ALIGN WITH MP18B-RT AT STA 291+90
18.0	RT	MP18B-RT	FARM FIELD	NO RECOMMENDATION
18.2	LT	MP18C-LT	FARM FIELD	NO RECOMMENDATION
18.2	RT	MP18D-RT	RESIDENTIAL	NO RECOMMENDATION
18.6	LT	MP18E-LT	FARM FIELD	NO RECOMMENDATION
18.8	RT	MP18F-RT	RESIDENTIAL/SHARED	RELOCATE AND ALIGN WITH MP18G-LT AT STA 303+65
18.8	LT	MP18G-LT	RESIDENTIAL/SHARED	NO RECOMMENDATION
19.0	RT	MP18H-RT	FARM FIELD	NO RECOMMENDATION
19.0	LT	MP18I-LT	FARM FIELD	NO RECOMMENDATION
19.4	LT	MP19C-LT	FARM FIELD	NO RECOMMENDATION
19.5	RT	MP19D-RT	FARM FIELD	NO RECOMMENDATION
19.5	LT	MP19E-LT	FARM FIELD	NO RECOMMENDATION
19.6	RT	MP19F-RT	FARM FIELD	REALIGN PERPENDICULAR TO HIGHWAY
19.6	LT	MP19H-LT	FARM FIELD	NO RECOMMENDATION
19.7	RT	MP19G-RT	FARM FIELD	NO RECOMMENDATION
19.7	RT	MP19I-RT	FARM FIELD	RECOMMEND CLOSING FARM FIELD APPROACH
19.7	RT	MP19J-RT	FARM FIELD	NO RECOMMENDATION
19.7	LT	MP19K-LT	PUBLIC	NO RECOMMENDATION
19.9	LT	MP19L-LT	PUBLIC	NO RECOMMENDATION
19.9	RT	MP19N-RT	FARM FIELD	NO RECOMMENDATION
19.9	LT	MP19O-LT	COMMERCIAL	NO RECOMMENDATION
19.9	LT	MP19P-LT	COMMERCIAL	NO RECOMMENDATION
20.0	LT	MP19Q-LT	RESIDENTIAL	NO RECOMMENDATION
20.0	RT	MP20A-RT	RESIDENTIAL	NO RECOMMENDATION
20.0	RT	MP20B-RT	RESIDENTIAL	NO RECOMMENDATION
20.0	RT	MP20BB-RT	FARM FIELD	NO RECOMMENDATION